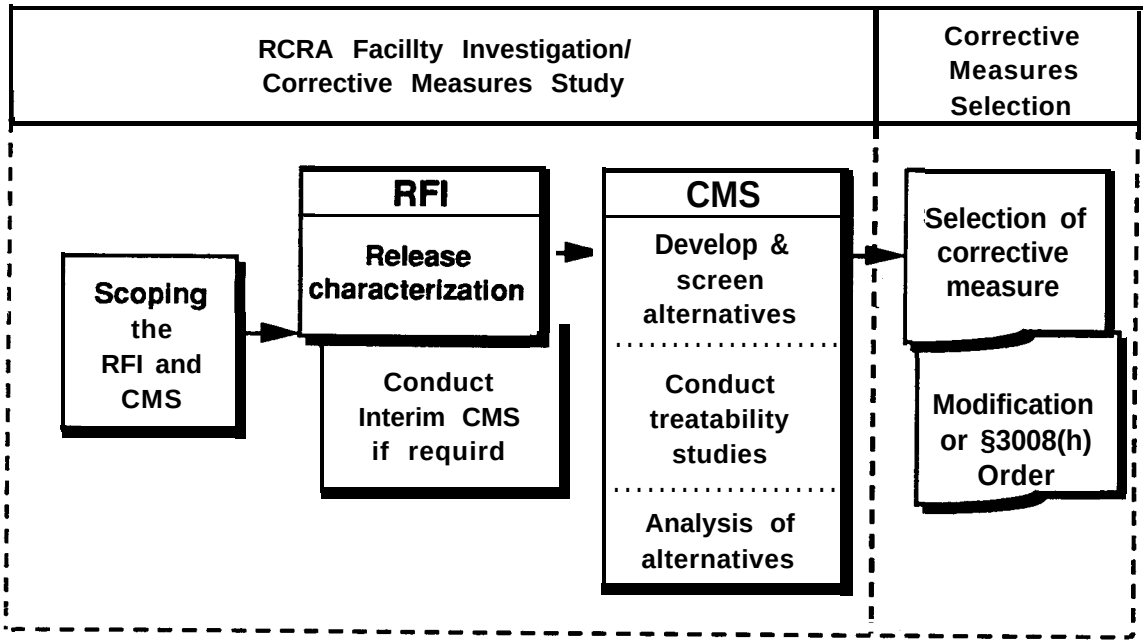
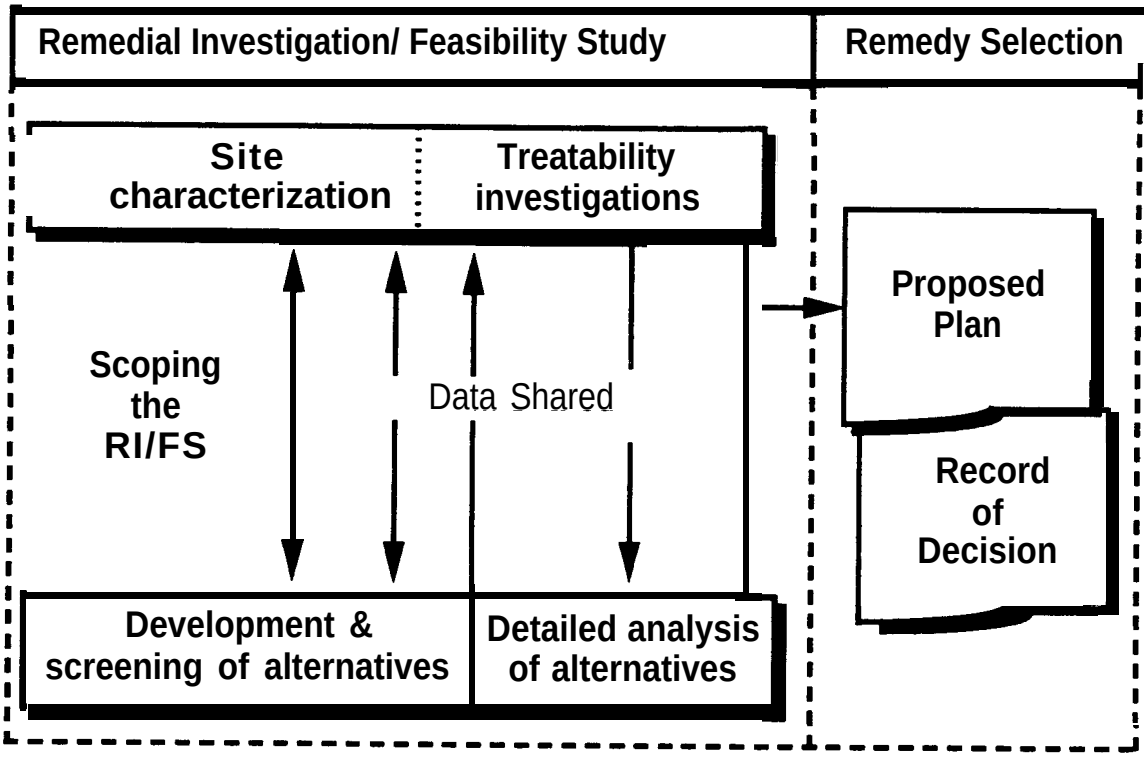
# Chapter 3
# The RCRA Facility Investigation/ Corrective Measures Study and The CERCLA Remedial Investigation/Feasibility Study

Figure 3-1

## RCRA Facility Investigation/Corrective Measures Study




## CERCLA Remedial Investigation/Feasibility Study



# Chapter 3
# The RCRA Facility Investigation/Corrective Measures Study and The CERCLA Remedial Investigation/Feasibility Study

## I. Introduction

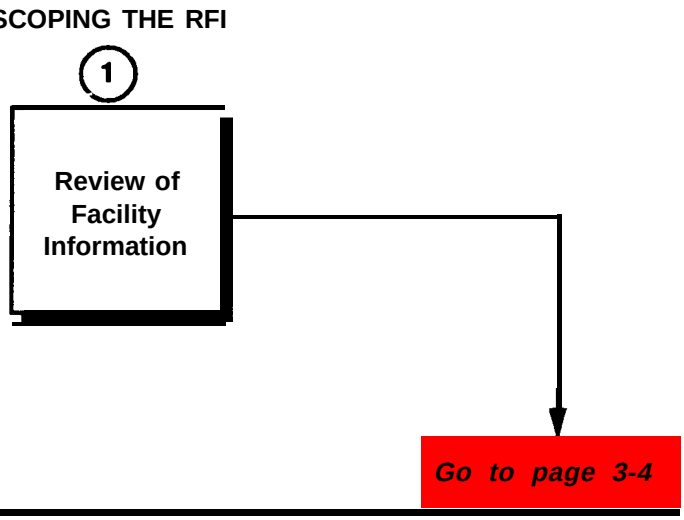
The RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) are detailed investigations to assess the extent, nature, associated risk, and alternatives for cleanup of actual or potential releases of hazardous wastes or hazardous waste constituents from solid waste management units (SWMUs) at an operating RCRA permitted or interim status treatment, storage, or disposal facility (TSDF). These releases are usually identified during the RCRA Facility Assessment (RFA). The CERCLA remedial investigation/feasibility study (RI/FS) is the methodology used to characterize the nature, extent, and risks posed by uncontrolled releases of hazardous substances, pollutants, or contaminants from closed or abandoned sites in order to make an informed risk management decision, and for evaluating potential remedial options for those sites.

There is an important difference between the RFI/CMS and the RI/FS: the RI and FS are conducted concurrently and interactively, while the CMS is required if the RFI determines that a release of a hazardous waste or hazardous waste constituent poses a threat to human health or the environment. In short, an RI is always associated with an FS, but an RFI is not necessarily followed by a CMS.

This chapter presents an overview of the following topics:

| RFI/CMS | RI/FS |
|---|---|
| **Scoping the RFI** | **Scoping the RI/FS** |
| **The RFI Plan** | **Conducting the RI: Site Characterization** |
| **Conducting the RFI** | **Conducting the RI: Baseline Risk Assessment** |
| **The RFl Report** | **The Remedial lnvestigation Report** |
| **Determination of No Further Action Requirement for a CMS** | **Feasibility Study: Development and Screening of Alternatives** |
| **Scoping the CMS** | **Treatebility Studies** |
| **The CMS Plan** | **Feasibility Study: Detailed Analysis of the Alternatives** |
| **The CMS** | **Development of the Feasibility Study Report** |
| **The CMS Report** | **Remedy Selection–Identifying the Preferred Alternative** |
| **Selection of the Corrective Measure** | **Remedy Selection end the Proposed Plan** |
| **Permit Modification** | **The Record of Decision** |

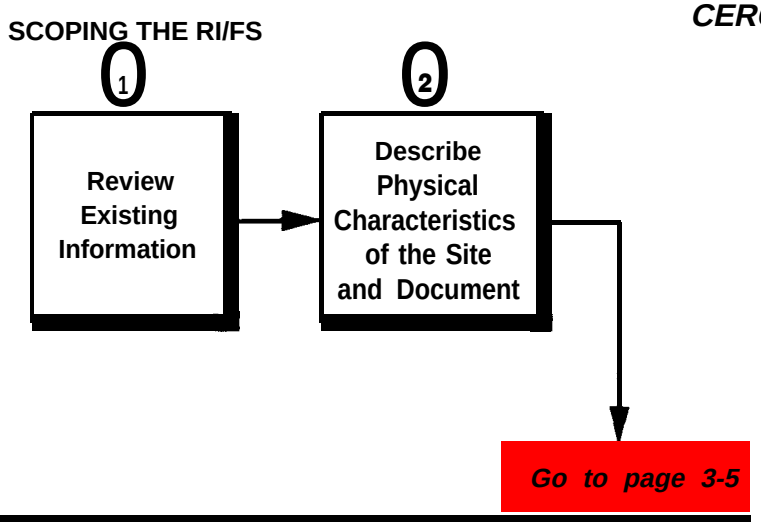
Figure 3-1 on the preceding page is a graphic representation of the portion of the two programs discussed in this chapter.




## II. Scoping the RCRA Facility Investigation

1. **Reviewing Facility Information.** The first phase of conducting the RFI is to collect and review all available information on the release, the SWMU, and the facility. Sources of information for this review include the facility permit or RCRA §3008(h) Order compelling the facility to conduct the RFI, the FFCA for the facility, reports of releases, reports on facility operations, the RFA report, interim measures reports, and reports of investigations or remedial activities conducted under other legal authorities. While recognizing that these documents may not include information on each of the following areas, the investigator should review the documents for information on the following:

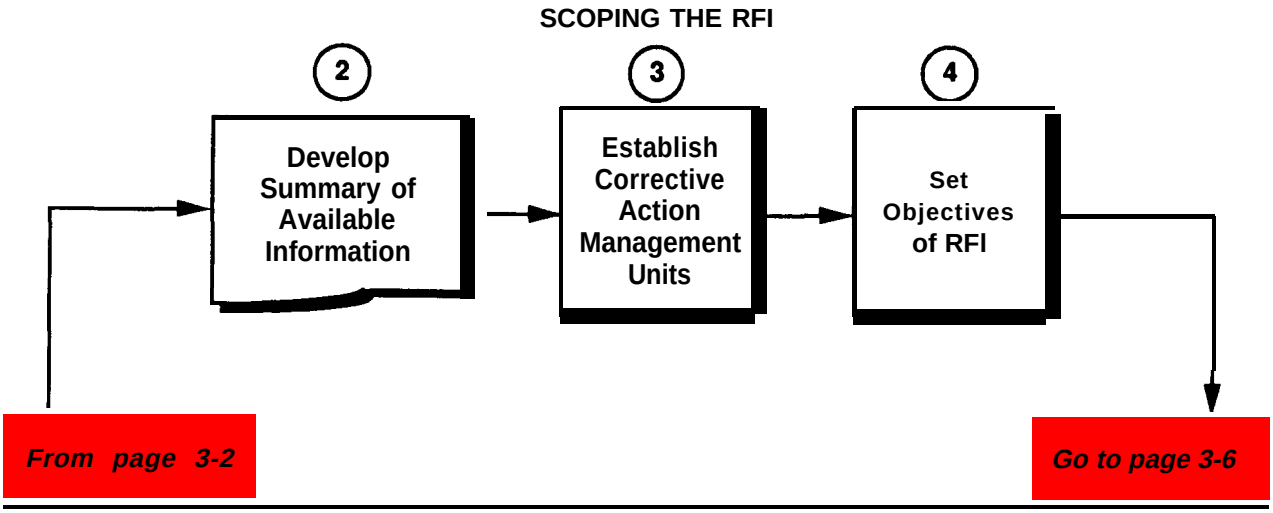
- **The characteristics of the release, including information on the identity, physical, chemical, and toxicological properties and estimated or known quantity or concentration released;**
- **The environmental setting of the facility, including geology, hydrogeology. topography, and population demographics; the reletionship of the SWMUs et the facility; end the relationship of the facility to the surrounding area;**
- **Any documented evaluations of the threats posed to human health and the environment;**
- **Any actions (including interim measures) taken at the facility to control or minimize the threat posed by the release;**
- **The terms and requirements of the permit, §3008(h) Order, or FFCA; and**
- **Current conditions and operations (including operations permitted under other legal authority) at the facility.**




## III. Scoping the CERCLA Remedial Investigation/Feasibility Study (RI/FS)

1. **Review Existing Information.** According to Section 2.2.2 of the EPA guidance document titled *Conducting Remedial Investigation/Feasibility Studies Under CERCLA {Interim Final)* (hereafter referred to as the EPA RI/FS guidance), the first step in scoping the RI/FS is to collect and review all available information in order to gain an understanding of the characteristics of the site. Sources of information for this review include the PA and SI reports, reports of releases and/or hazardous waste operations submitted under CERCLA §103 or CERCLA §120, and reports of actions taken under other legal authorities. The documents are reviewed for information on the environmental setting, any risk evaluations, any previous actions (i.e., removals), the specific terms and requirements of the Federal Facility Agreement (FFA), and the current conditions and operations at the site.

2. **Describe tha Physical Characteristics of the Site.** The existing data should be used to develop a site description that includes discussion of the location, topography, geology, land use, waste types, estimated waste volume, and other pertinent information. The site description should also include a chronology of significant events at the site, such as known releases, chemical and waste management practices used at the site, and other response actions (e.g., removals) or regulatory oversight that have occurred at the site. The EPA RI/FS guidance recommends that this information be summarized in a technical memorandum or other appropriate document.

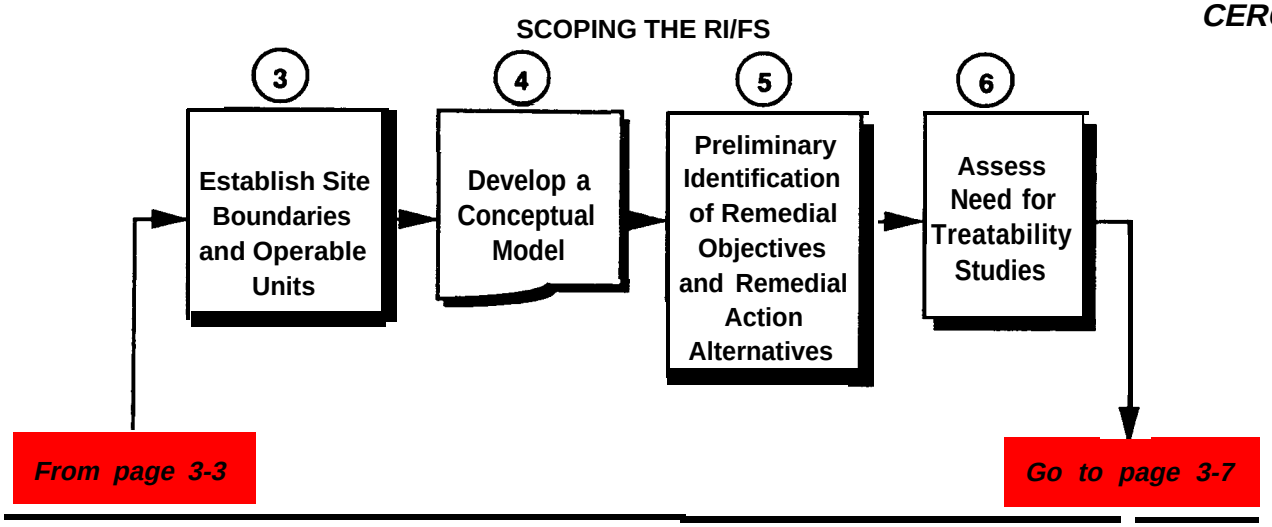



2. **Document Available Information.** The facility should prepare a brief document summarizing the results of this review process for use as a reference during the scoping pcess, and for inclusion in the final RFI report.

3. **Establish CAMUs.** The next step of the scoping process is to evaluate the potential for, and benefits of, establishing CAMUs at the facility. Under the new regulations for CAMUs (58 FR 8658, February 16, 1993), EPA can designate an area at a facility for the purpose of managing remediation wastes generated during corrective action. The identification of a CAMU usually takes place during the process for the selection of the corrective measure, but may occur at any time during the corrective action process. Based upon the review of information about the site, DOE should propose any appropriate areas as CAMUs. The primary benefit of using a CAMU to manage remediation wastes at a facility is that management and disposal of contaminated materials generated by corrective action activities at the facility can be conducted in a CAMU without requiring compliance with the land disposal restrictions or the minimum technology requirements for a new or lateral expansion of a unit.

4. **Set the Objectives of the RCRA Facility Investigation.** An important step in the scoping process is establishing the objectives of the RFI. The DOE RCRA Corrective *Action Program Guide* suggests that DOE should develop a document describing in detail the objectives set for the RFI. The specific objectives of an RFI may include the following:

- **Characterization of the environmental setting of, and the SWMU(s) at, the facility:**
- **Description of the human and environmental receptors that are, have been, or may be exposed to the release;**
- **Collection of information used to characterize the risk posed by the release end to extrapolate future contaminant migration;**
- **Datermination of the need for laboratory, bench-scale. or pilot-scale tests or studies to determine the feasibility or effectiveness of treatment or other technologies that may be appropriate in implementing remedies et the faciliti; and**
- **Statistical analysis of the date collacted during the investigation.**

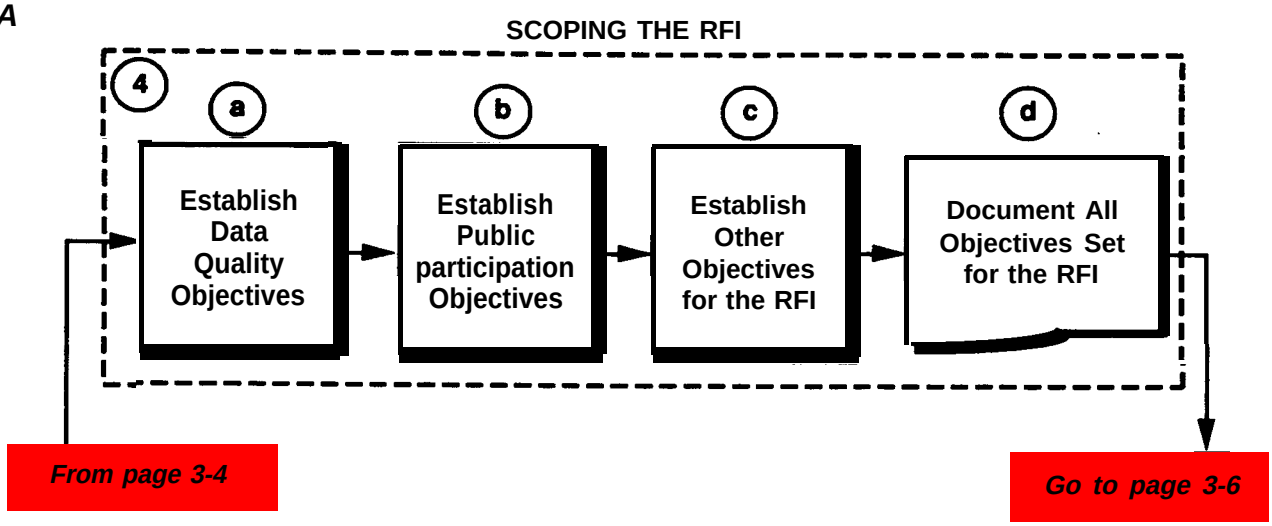



3. **Establish Site Boundaries and Operable Units.** The next step in scoping the RI/FS is establishing the site boundaries and establishing any operable units. The site boundary, according to the NCP (onsite), is defined as the "areal extent of contamination and all suitable areas in very close proximity...necessary for implementation of the response action." Operable units are discrete response actions conducted at a single part of a site, or conducted concurrently at different parts of the site.

4. **Develop a Conceptual Model.** Based upon the data collected during the review of existing information, a conceptual model of the site should be developed. A conceptual model, as described in the EPA guidance *Data Quality Objectives for Remedial Program Activities, Volume 1,* is a brief document providing a narrative, graphical, and/or pictorial description of the site.

5. **Preliminary Identification of Remedial Objectives and Remedial Action Alternatives.** Once the existing information about the site is analyzed and a conceptual model is developed, preliminary remedial objectives (e.g., residual contamination concentrations that are acceptable) are established for each contaminated medium. Based upon these objectives, potential remedial alternatives (i.e., remedial technologies which may prove effective) capable of achieving these objectives are identified.

6. **Assess the Need for Treatability Studies.** Once the potential remedial options are identified, the next step is to assess the need for treatability studies to determine the effectiveness of each potential remedial alternative. Treatability studies, especially pilot-scale studies, may take months to complete and should begin as quickly as possible to minimize delays in accomplishing the RI/FS. Additional information on treatability studies can be found in the EPA guidance document titled *Guide for Conducting Treatability Studies Under CERCLA (Interim Final).*



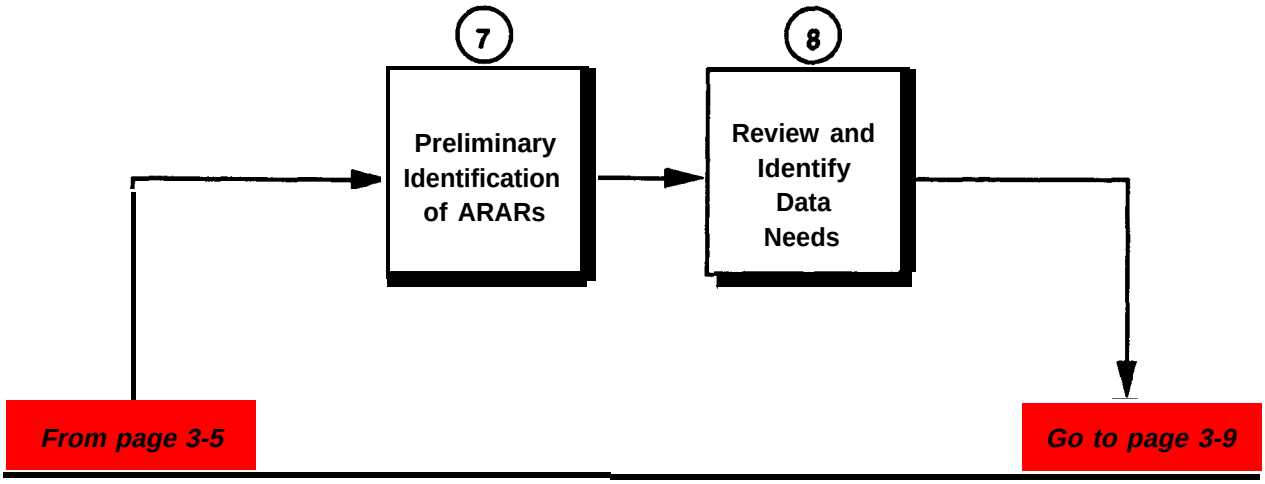

**a.** When setting the objectives of the RFI, particular importance should be attached to establishing the data quality objectives (DQOs) for the investigation. DQOs, as described in the EPA guidance document titled *Data Quality Objectives for Remedial Program Activities, Volume 1,* are qualitative and quantitative statements that identify the types, quantity, quality, and process for RFI data collection. Developing DQOs is specific to the facility and the SWMU or CAMU under investigation; however, some elements of the DQOs developed for one phase of the corrective action process may be applicable to other phases. The process of developing DQOs has three phases: (1) identifying the types of decisions the data support, (2) identifying data uses and needs, and (3) designing the data collection program. In the document detailing the objectives for the RFI, DOE should include a discussion of DQO development outlining the following:

- **Data collection and management strategy,**
- **Sample collection and analysis strategy, end**
- **Standards for field measurements.**

**b.** Another objective of the RFI is promotion of public participation in the RCRA Corrective Action process. While a certain amount of public participation is built into the corrective action process, it is usually prudent to implement a strong community outreach program. If concurrent compliance with CERCLA is required, the community relations element becomes mandatory. For additional information refer to the DOE Office of Environmental Guidance publication *Public Participation in Environmental Restoration Activities* (November 1991).

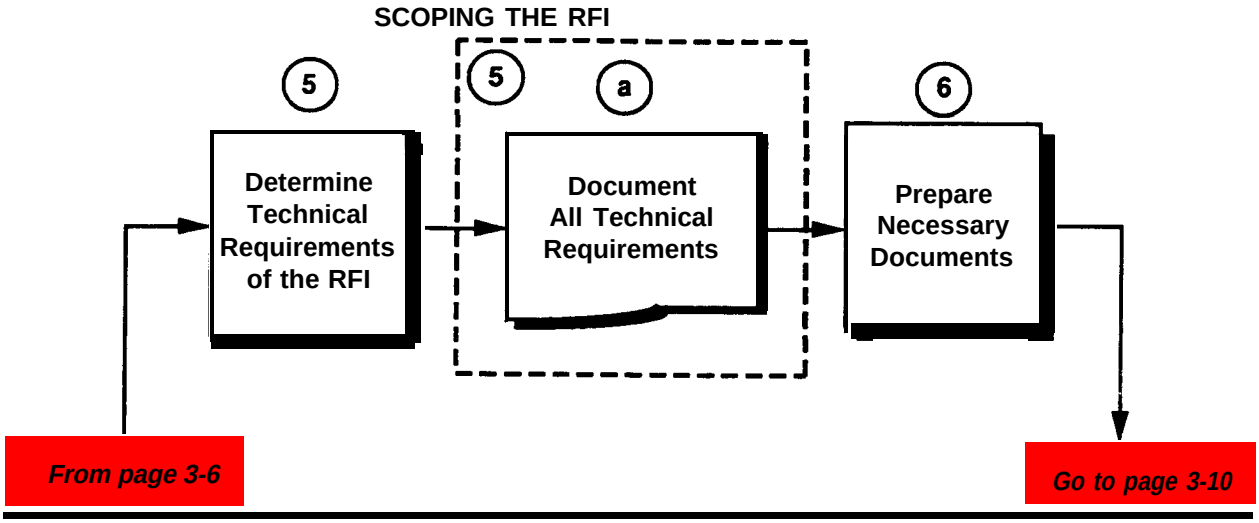
**c.** As discussed in the DOE *RCRA Corrective Action Program Guide,* other objectives developed during the scoping process may include adherence to the permit schedule of compliance requirements for the RFI, setting an acceptable degree of risk posed to workers engaged in conducting the RFI, or more general policy statements. Setting objectives provides direction for the scoping and conduct of the RFI and also provides a clearly defined means of assessing the progress of the RFI. All objectives should be discussed in the document describing the objectives of the RFI.

**d.** DOE should **develop a document detailing the objectives established for the RFI** for use as a project management tool. Such a document will prove useful when conducting periodic reviews of the progress of the RFI.




**7. Preliminary Identification of Applicable or Relevant and Appropriate Requirements (ARARs).** Once the preliminary analysis of information about the site and the options for remediation is complete, identification of potential Federal and State ARARs begins. ARARs may be chemical-specific requirements defining acceptable exposure limits; location-specific requirements such as floodplain or wetlands restriction; or action-specific requirements that prohibit or restrict certain responses. The identification of ARARs at this point helps in the identification of potential remedial alternatives and also helps focus later phases of the RI/FS. Additional information on ARARs can be found in the EPA guidance document CERCLA *Compliance with Other Laws Manual, Parts 1 and 2 (19891.*

**8. Review and Identify Data Needs.** Based upon a review of existing information, additional data requirements to better characterize the site and to better define the remedial objectives are identified. For example, the need for additional data on groundwater quality and hydrogeological conditions may be needed to assess remedial alternatives.

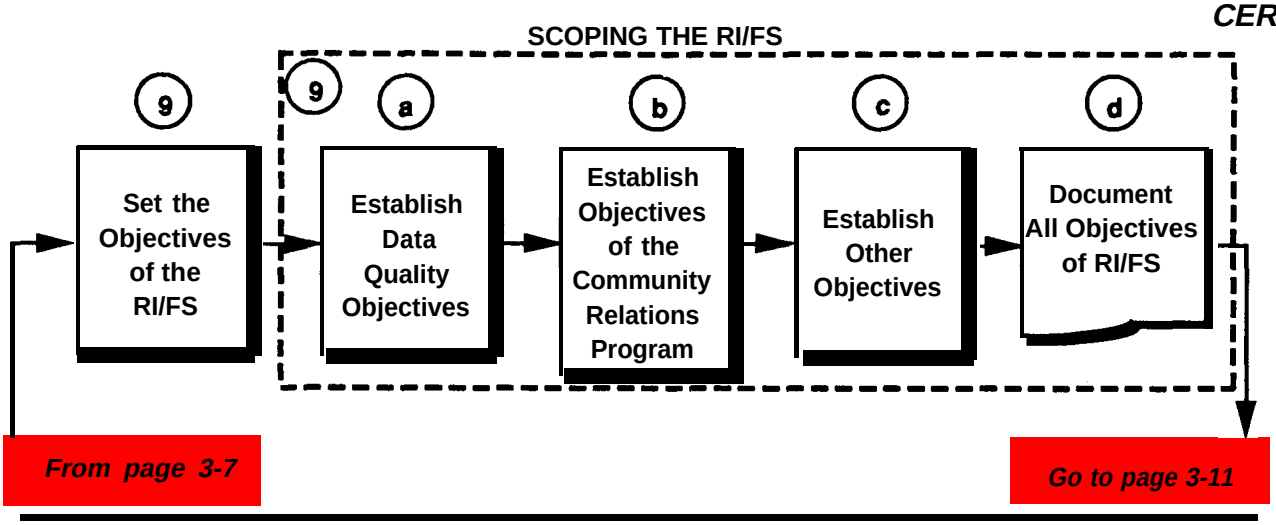



**5. Determining the Technical Requirements of the RCRA Facility Investigation.** The DOE *RCRA Corrective Action Program Guide* describes three categories of technical requirements. The first, the general technical requirements for the RFI, arises from available information on the nature and extent of the release, the affected media, and any requirements of the facility's permit, RCRA §3008(h) Order, or FFCA. The second category includes the specific requirements for collecting and analyzing environmental samples. These requirements are usually defined by the DQOs established for the investigation. The last category is the technical requirements arising from applicable statutory or regulatory requirements, such as the test methods for determining if a solid waste exhibits a characteristic of a hazardous waste.

All three categories may apply during an RFI. For example, if a release from an SWMU impacts groundwater, the RCRA §3008(h) Order usually includes a general technical requirement for assessing groundwater quality. Accomplishing this requires installation of monitoring wells meeting specific standards for construction and the collection and analysis of samples according to acceptable scientific practices. These represent specific technical requirements. Under the proposed Subpart S rule, 40 CFR §261 Appendix Vlll and 40 CFR §264 Appendix IX specify the compounds for which analysis is conducted as part of the groundwater quality assessment, thus constituting a regulatory technical requirement.

**a.** DOE should develop a document listing the technical requirements for the RFI. This document is useful in other elements of the scoping process, preparation of the RFI plan, contracting, and preparation of the RFI report.

**6.. Preparing Necessary Documents.** Conducting an RFI usually requires development of several documents, including a site conceptual model, a program management plan (PMP), a data collection quality assurance plan (DCQAP), a data management plan (DMP), a health and safety plan (HASP), and a public involvement plan (PIP). While a DCQAP, DMP, HASP, and PIP are not specifically required by EPA, the EPA guidance on conducting RFIs suggests developing these documents, and the RFI plan will require discussion of most of the elements of these documents. Further, developing these documents represents a "best management practice," and, as such, is a strong recommendation for developing them as part of the scoping process. The DOE *RCRA Corrective Action Program Guide* provides additional information on the elements of each of these documents.




**9. Setting the RI/FS Objectives.** One of the most important steps in scoping is establishing the objectives for the RI/FS. The principal objectives of the RI/FS include, but are not limited to, the following:

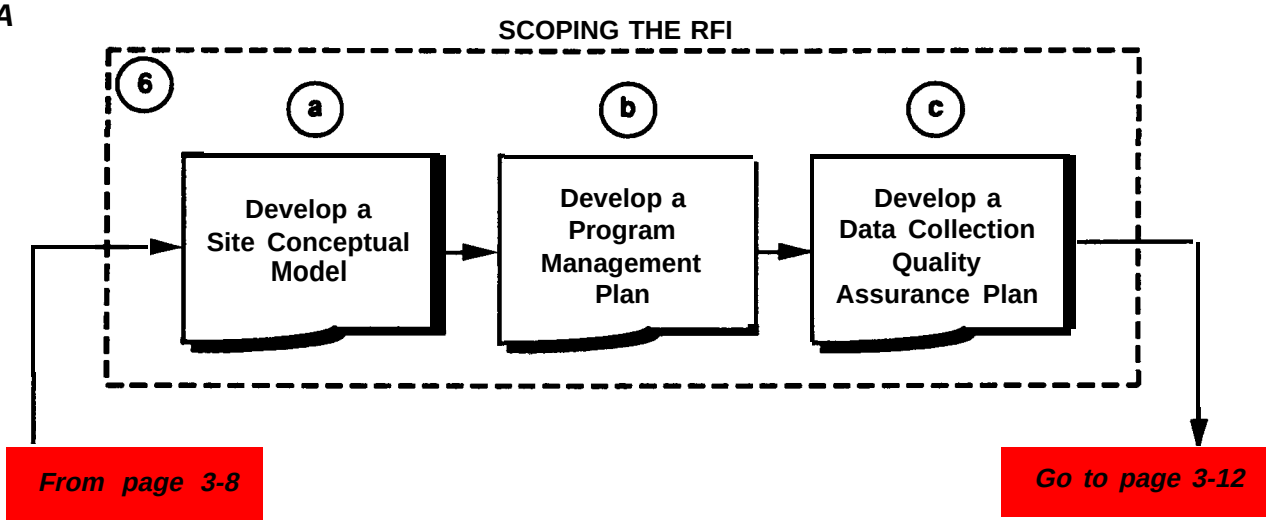
- **Collecting sufficient data to characterize the environmental setting;**
- **Characterizing the source of the contamination:**
- **Determining the human and environmental receptors that are, have been, or may be exposed to the release;**
- **Collecting information used to characterize the risk posed by the release; and**
- **Projecting future contaminant migration.**

**a.** Establishing the ***data quality objectives (DQOs)*** for the investigation is an important part of setting the overall objectives for the RI/FS. DQOs are qualitative and quantitative statements that identify the types, quantity, quality, and process for RI/FS data collection (e.g., the number of samples required). That is, they determine the quantity and quality of data that will be needed to make a specified decision. DQOs also directly link data collection to decision-making. DQOs are site specific; however, elements of the DQOs developed for one site may be applicable to other sites. A document should be prepared discussing the development of the DQOs that outlines the data collection and management strategy, the sample collection and analysis strategy, and the standards and acceptability criteria for field measurements.

**b.** Another objective of the RI/FS is to meet the CERCLA §117 requirement for public participation in the remedy selection process. As part of the scoping process, DOE should conduct interviews with community members in an effort to provide sufficient information for development of the ***community relations plan (CRP).*** Further information can be found in the DOE guidance document titled *Public Participation in Environmental Restoration Activities* (November 1991).

**c.** ***Other objectives*** developed during the scoping process may include the following: (1) adherence to a schedule for the RI/FS, and (2) establishment of the acceptable degree of risk posed to workers engaged in onsite activities.

**d.** *A **single document detailing all the objectives*** established for the RI/FS should be prepared for use as a project management tool, Setting specific objectives provides direction for the scoping and conduct of the RI/FS and defines ways of assessing the progress of the RI/FS. This summary is not a regulatory requirement, but it will be useful in preparing other required documents.

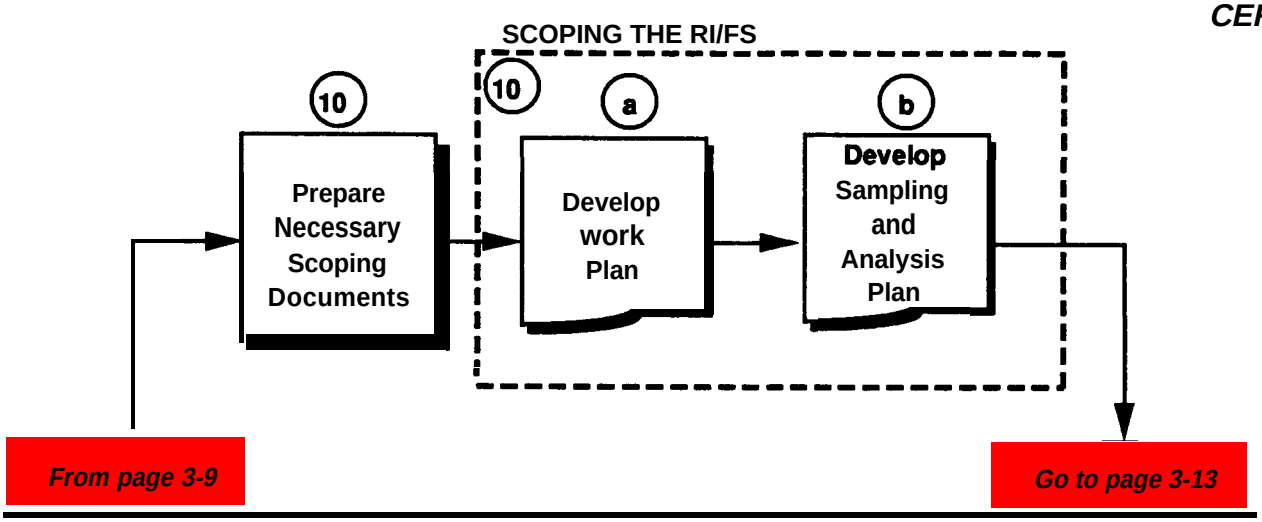



**a.** The site conceptual model for the facility is a narrative description of the facility, developed from information gathered during the review of existing information. This model is used to develop hypotheses regarding the extent of contamination at the facility, the available routes of migration, and the potential threats posed to human health and the environment. The hypotheses developed in the conceptual model are tested, redefined, and modified during the course of the RFI.

**b.** Given the size and complexity of most DOE facilities, it is likely the facility will ***prepare a facility-wide Installation Work Plan*** *folloewd by SWMU-specific work plans. If this approach is* used, it is necessary to develop a program management plan (PM P). A PMP describes:

- **The mission of the program;**
- **The chain-of-command and specific delegations of responsibility;**
- **Any internal reporting requirements;**
- **All programmatic quality assurance (QA) objectives and procedures including provisions for QA audits; and**
- **The minimum acceptable performance standards for developing documents (i.e., DCQAPs, work plans, HASPs, etc.), conducting investigations or remedial activities, and for required report formats.**

**c.** A ***data collection quality assurance plan (DCQAP)*** is a document that presents in specific terms the data collection strategy, sampling and analysis procedures, sample collection points, and field measurement procedures designed to achieve adequate data quality. The requirements of a DCQAP are discussed in the EPA guidance document RCRA *Corrective Action Plan* (Interim Final, November 1988).

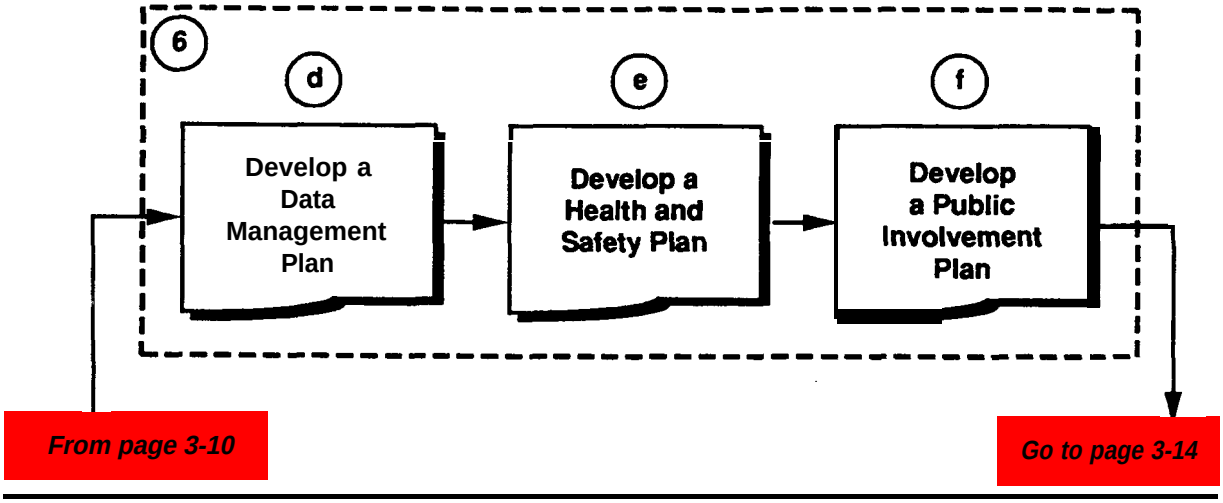



**10. Prepare Necessary Scoping Documents.** The next step in scoping the RI/FS is to begin development of the planning documents for conducting the RI/FS. There are four planning documents required to conduct an RI/FS: (1) an RI/FS work plan, (2) a sampling and analysis plan (SAP), (3) a health and safety plan (HASP), and (4) a CRP. In addition, developing a data management plan (DMP) is recommended as a "best management practice."

**a.** The ***work plan documents*** the decisions and evaluations made during the review of existing information about the site and describes in detail the tasks required to complete the RI/FS. A detailed work plan also provides necessary information to develop a schedule for, and to estimate the cost of, the RI/FS. According to the EPA guidance on conducting an RI/FS, an RI/FS work plan has five elements: (1) the introduction; (2) a discussion of background information and the environmental setting of the site; (3) the initial evaluation of site conditions; (4) the work plan rationale; and (5) the RI/FS tasks.

**b.** The next planning document, the SAP, is required by 40 CFR §430(b)(8). A SAP has two parts: the ***quality assurance project plan (QAPP)*** and the ***field sampling plan (FSP).*** A QAPP describes the policy, organization, functional activities, and quality assurance and quality control (QA/QC) protocols necessary to achieve the DQOs developed previously. The EPA guidance document *Interim Guidelines and Specifications for Developing Quality Assurance Project Plans (QAMS 005/80)* describes the format and required elements of a QAPP. An FSP provides a detailed discussion of the sampling objectives, methods, frequency, and rationale for field operations. The elements of an FSP are discussed in Volume 4 of the EPA document *Test Methods for Evaluating Solid Waste, 3rd Edition (SW-846).* The basic requirements of an FSP include discussion of site background, sampling objectives, sampling point location and sampling frequency, sample identification, sampling equipment and procedures, and sample handling and analysis.

SCOPING THE RFI




**d.** A ***data management plan (DMP)*** is a document that details the acceptable methods for recording and presenting data collected during the RFI. The specific elements of a DMP are:

- **A discussion of the elements for the data record,**
- **The format for the tabular display of data, and**
- **The format for the graphical display of data.**

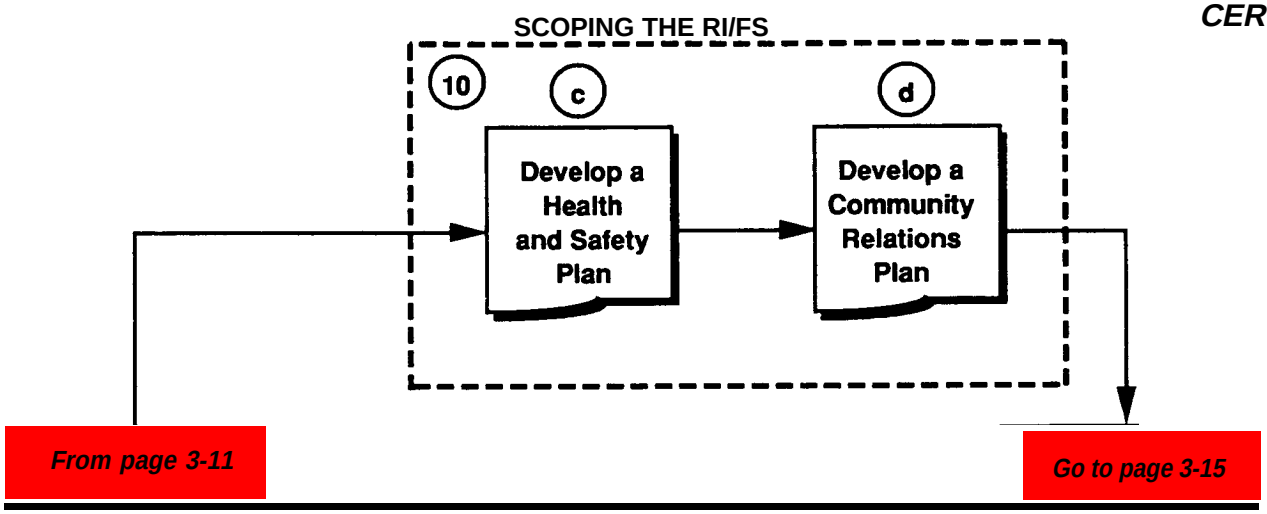
**e.** A ***health and safety plan {HASP),*** a legal requirement under 29 CFR § 1910.120, details the operational and institutional guidelines for ensuring the health and safety of employees engaged in any RCRA Corrective Action where there is a possibility of employee exposure.

**f.** The ***public involvement plan (PIP)*** is a document that outlines the procedures for disseminating to the public information on the results of the investigation. The elements of a PIP include the following:

- **Provisions for interviewing local governmental officials, community leaders, and affected individuals to assess the concerns of the surrounding population:**
- **Specific plans to provide notification of the availability of information onon site conditions end the results of investigations;**

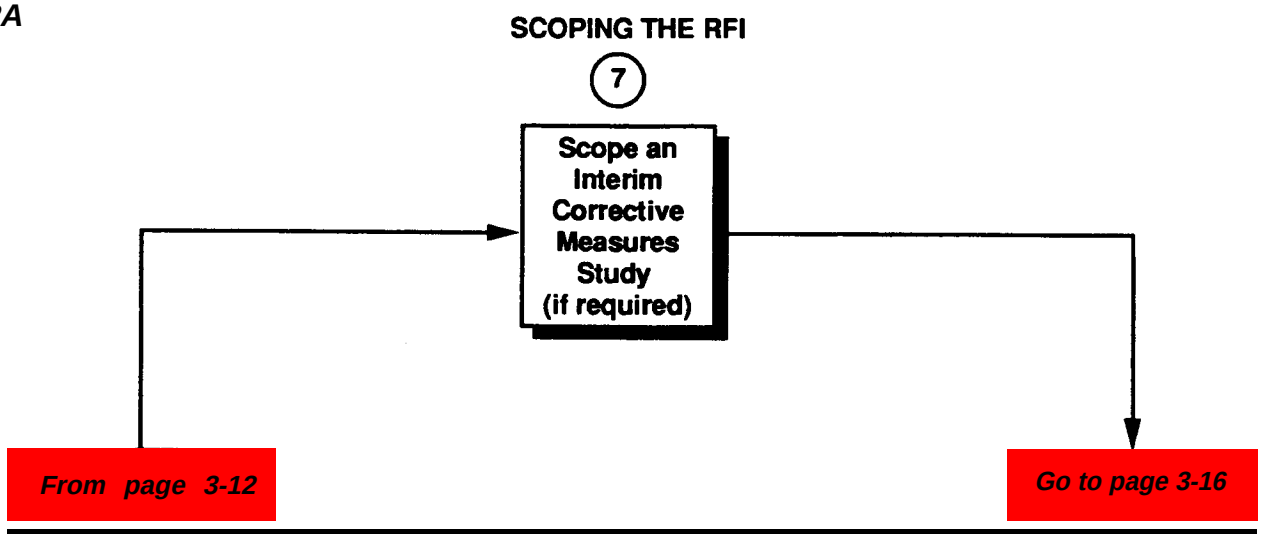
  **Plans for conducting public meetings to communicate directly with the citizens in the local community; and**
- **Provisions for a local information repository and administrative record.**

Many of the elements of a PIP will support the public involvement requirements of the permit modification and the process to select the corrective measure.

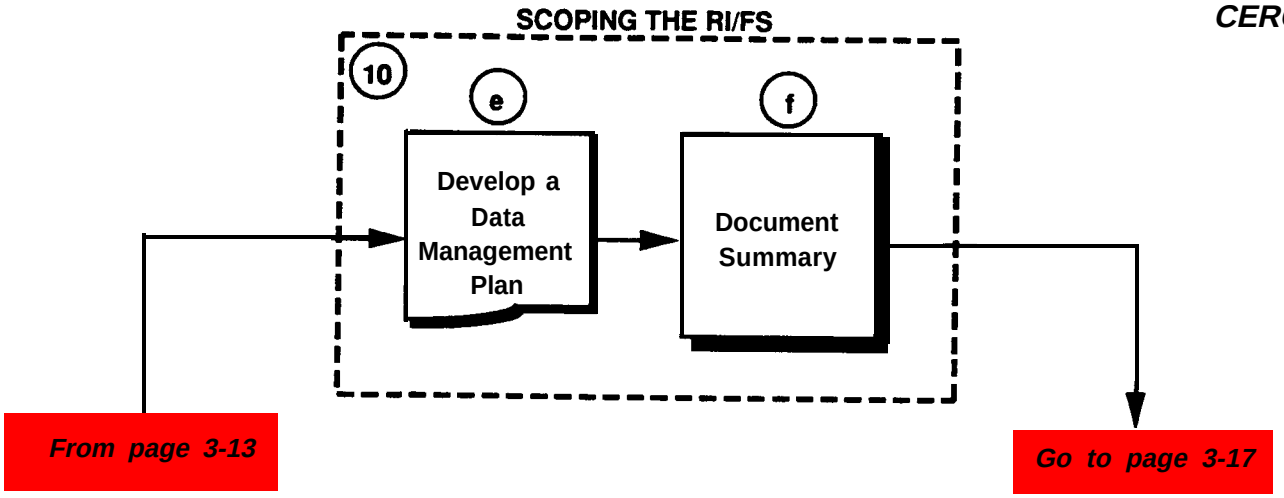



**c.** **A *health and safety plan (HASP)*** is required under 29 CFR § 1910.120 and under 40 CFR §300.430(b)(6). The HASP details the operational and institutional guidelines for ensuring the health and safety of employees engaged in any CERCLA response action where there is a possibility of employee exposure. The minimum required elements of an HASP are outlined in the EPA Guidance document *Health and Safety Roles and Responsibilities at Remedial Sites* (July 1991).

**d.** The ***community relations plan (CRP)*** is a document that outlines the procedures for disseminating to the public information on the results of the RI/FS. An active community relations program is required and the elements are outlined in 40 CFR §300.430(c). DOE's "Streamlined Approach for Environmental Restoration" (SAFER) recommends involvement of all "stakeholders" (e.g., the State, local community) as early as possible, to prevent later disputes from impacting the RI/FS and RD/RA processes. DOE has developed a detailed guidance document entitled *Public Participation in Environmental Restoration Activities* that provides information on the specific requirements for community relations.




**7.** **Scoping an Interim Corrective Measures Study.** While a CMS will usually follow completion of the RFI, under proposed 40 CFR §264.511(a)(6) EPA can require DOE to conduct an interim CMS to prevent delays in advancing through the corrective action process. Usually an interim CMS involves conducting limited-scale treatability studies to evaluate the effectiveness of one or two remedial technologies. EPA may, however, require other activities.




**e.** A ***data management plan (DMP)*** is not a specific requirement for conducting an RI/FS. However, an RI/FS generates an extensive amount of information, and the EPA RI/FS guidance recommends developing a DMP as standard RI/FS project management practice. The quality, consistency, and documentation supporting the data collected during the RI/FS must be ensured because the data are the basis of remedy selection. The areas a DMP should address include the following:

- **Documentation of sample collection, QA/QC, and custody during field activities;**
- **Sample management and tracking in the laboratory;**
- **Data reduction, validation, and reporting requirements; and**
- **Document inventory end control.**

**f.** In summary, the following documents typically are prepared when scoping an RI/FS:

**Planning documents:**

- **A conceptual model.**
- **The preliminary statement of all objectives of the remedial investigion/feasibility study.**

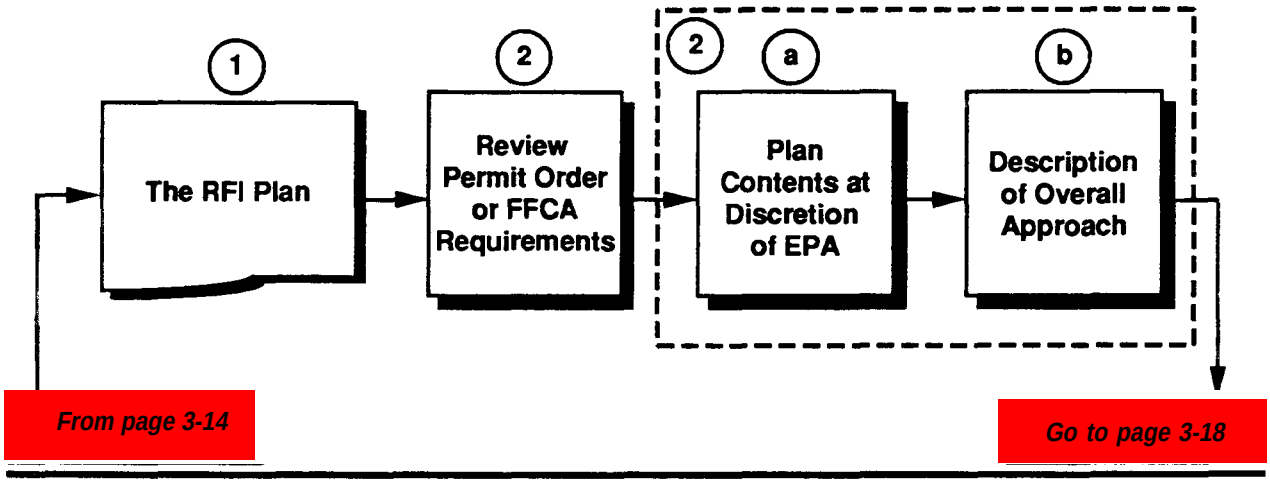
**Required documents:**

- **The RI/FS work plan.**
- **The sampling and analysis plan (consisting of the field sampling plan end the quality assurance project plan).**
- **The HASP.**
- **The CRP.**

**Recommended document:**

- **The DMP.**

THE RFI PLAN




## IV. The RCRA Facility Investigation Plan

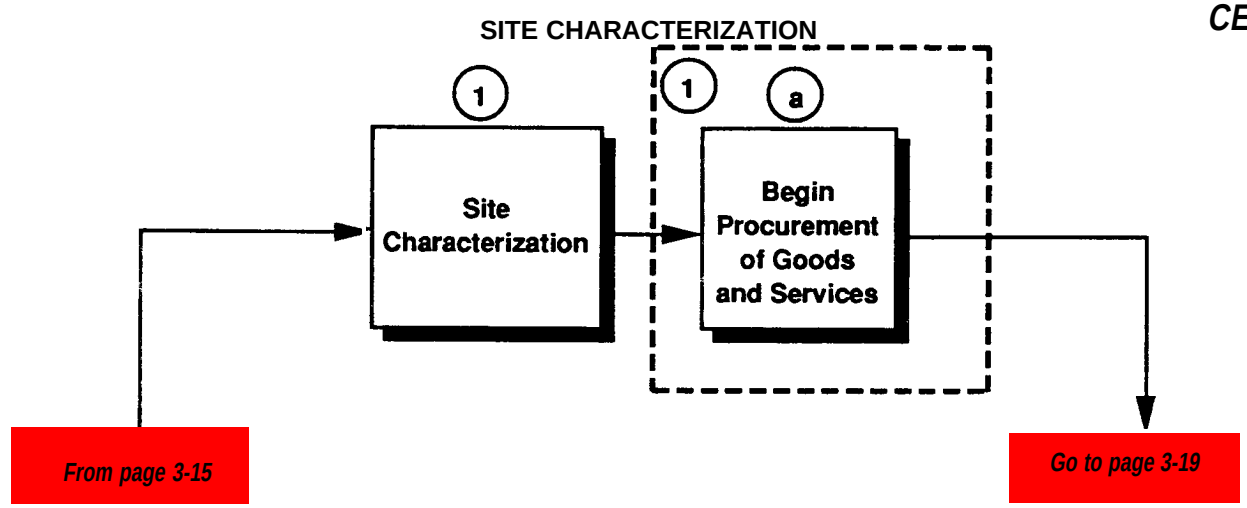
1. **The RFI Plan.** Conducting an RFI requires the development of the RFI plan. Under proposed 40 CFR 264.512 of the Subpart S rule, submission of an RFI plan is not mandatory; however, EPA usually requires that RFI plans be subject to EPA review and approval. The approved plan becomes a part of the facility permit and is subject to the permit schedule of compliance.

2. **Plan Contents.** The first step in developing the RFI plan is to review the permit, RCRA §3008(h) Order, or FFCA for requirements to submit an RFI plan to EPA and for specific content or format requirements.

a. Under the proposed Subpart S rule, the contents of the RFI plan are decided by EPA; however, the plan should include discussion of the overall approach to the investigation.

b. A description of the overall approach to the investigation should include the following:

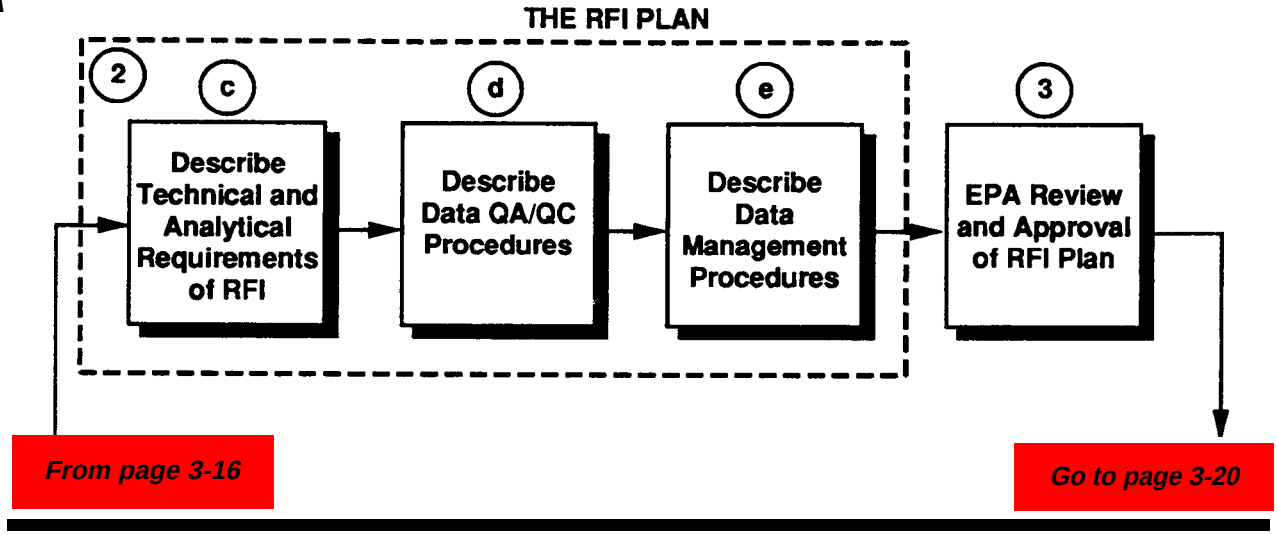
- **A discussion of the objectives for the investigation,**
- **A proposed schedule for the investigation,**
- **The qualifications of the persons invoked in conducting the investigation,**
- **Reference to any CAMUs established, and**
- **A plan for assessing the progress and direction of the investigation as the results of data collection and analysis begin to provide understanding of facility conditions.**




## v . Conducting the CERCLA Remedial Investigation: Site Characterization

1. **Site Characterization.** Site characterization is conducted to assess the threat a site poses to human health and the environment. The process of site characterization, described in detail in the EPA RI/FS guidance, is largely a matter of implementing the work plan and the SAP developed during the scoping process.

a. Field work support activities, such as ***procurement of goods and services,*** coordination with analytical laboratories, and coordination of onsite facilities, are a significant part of conducting the site characterization. Since procurement of goods or services can take several months, this process should begin prior to the initiation of onsite activities.



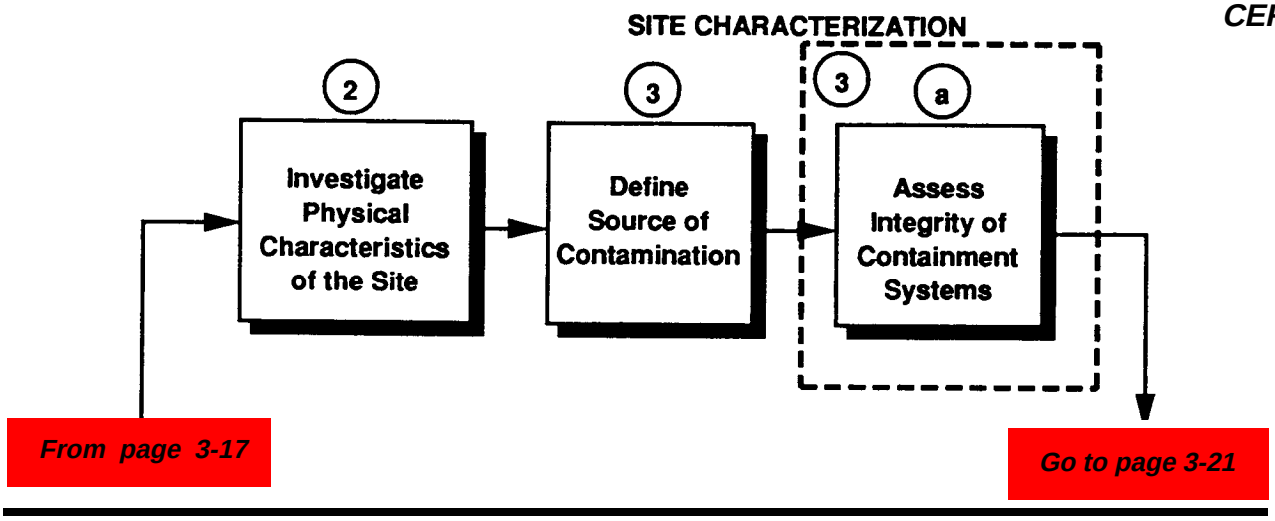

c. ***A specific description of the technical and analytical requirements*** for conducting the investigation must be included, as well as a discussion of how the RFI plan will fulfill these requirements. Many of the documents prepared during the scoping process may be inserted directly into this section of the RFI plan. These documents include:

- **The program management plan,**
- **The data collection quality assurance plan and date management plan,**
- **The date quality adjectives summary, and**
- **The list of specific end regulatory technical requirements for the investigation.**

d. The quality assurance and quality control procedures that are to be followed during the RFI are addressed in the DCQAP developed during the scoping process. To fulfill this requirement, the DCQAP should be incorporated directly into the RFI plan.

e. Discussion of the data management procedures and format is to ensure that RFI data and summary results are presented in a clear and logical manner.

**3. EPA Review end Approval of RFI Plan.** Once the draft RFI plan is complete, DOE will submit it to EPA for review and approval. If the draft RFI plan is not approved, any necessary revisions must be discussed and negotiated with EPA, and the plan revised and resubmitted. The final EPA-approved RFI plan will be incorporated into the facility permit schedule of compliance.



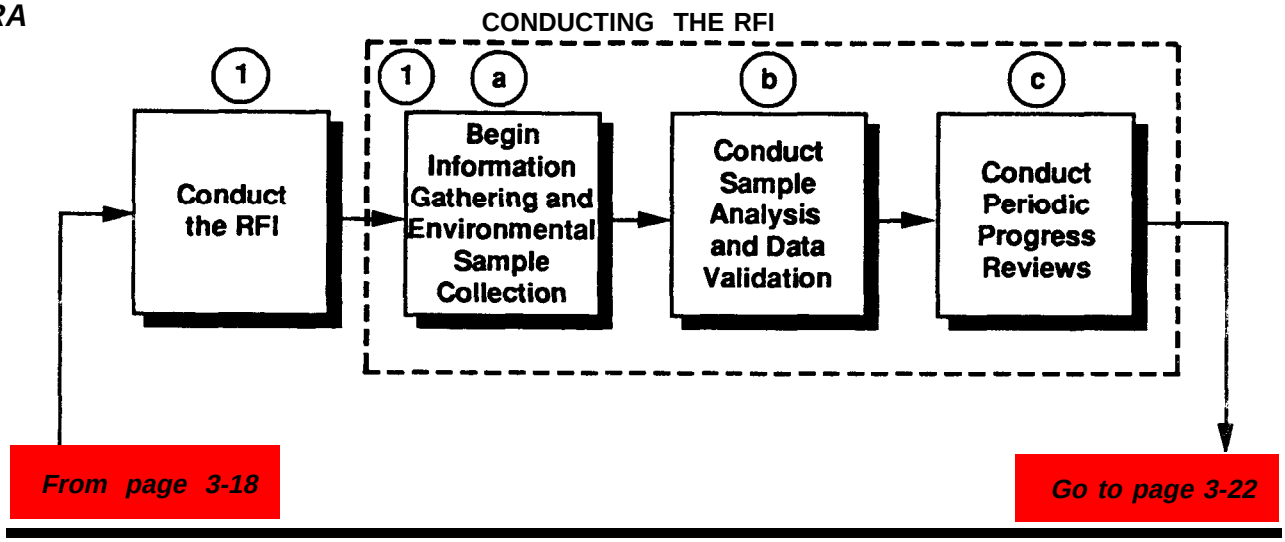

2. **Investigate Physical Characteristics of the Site.** The first step in site characterization is to investigate the physical characteristics of the site. This process includes, but is not limited to, the following:

- **Examination of surface features such as topography, structures, waste disposal areas, vegetation, or surface water bodies or drainage routes;**
- **Assessment of the regional geology of the site, as well as certain site-specific geology such es aquifer depth, location, and areal extent;**
- **Determination of the characteristics of site soils and the vadose zone;**
- **Analysis of surface water hydrology and the hydrogeology of the site:**
- **Determination of the prevailing local meteorological conditions; and**
- **Identification and characterization of effected human populations and assessment of local flora, fauna, or ecologic conditions.**

3. **Define Source of Contamination.** The next phase of site characterization is to define the source of the contamination. Source characterization involves collecting data to describe the following:

- **Facility characteristics and the source location. potential releasas, and engineering characteristics that are important in the evaluation of remedial alternatives;**
- **Waste characteristics, including the identity end quantity of any materials released; and**
- **The physical, chemical, and toxicologic properties of the hazardous substances, pollutants, or contaminants present in the source of the release.**

**a.** The characterization of sources includes assessment of the integrity of any containment vessels or engineered features designed to prevent or control releases.



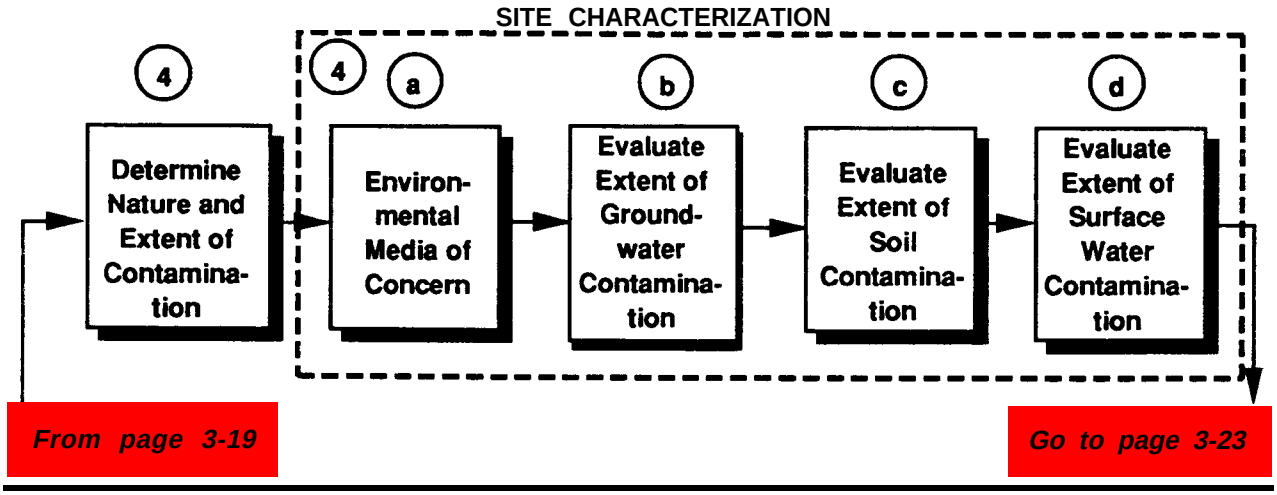

## VI. Conducting the RCRA Facility Investigation

**1.** **Performing the RFI.** The actual performance of the RFI has three elements: (1) implementation of the planned procedures for information gathering and sampling activities; (2) sample analysis and data verification: and (3) periodic progress assessmenys. A more detailed discussion of the conduct of an RFI can be found in the EPA document *RCRA Facility Investigation Guidance, Volumes 1-4 (1989).*

**a.** The first element, ***information gathering and sample collection activities,*** is a matter of implementing the field measurement and sampling activities specified in the RFI plan and DCQAP. This involves such activities as installation of monitoring wells, collecting soil, water, or air samples; collection of information on the surrounding community; and waste characterization.

**b.** The second element, ***sample analysis and data validation,*** is largely a process of implementing the DCQAP and DMP.

**c.** The third element, ***periodic progress review,*** involves reviewing the collected data, evaluating the success and problems encountered during the investigation, and assessing whether the investigation is fulfilling the objectives set for the RFI. If the review finds implementation problems, or if the data collected reveal an unanticipated source or type of contamination, the investigation scoping process and RFI plan should be reexamined to determine their adequacy. The findings of these reviews should be documented for use in preparing both periodic reports and the final RFI report.



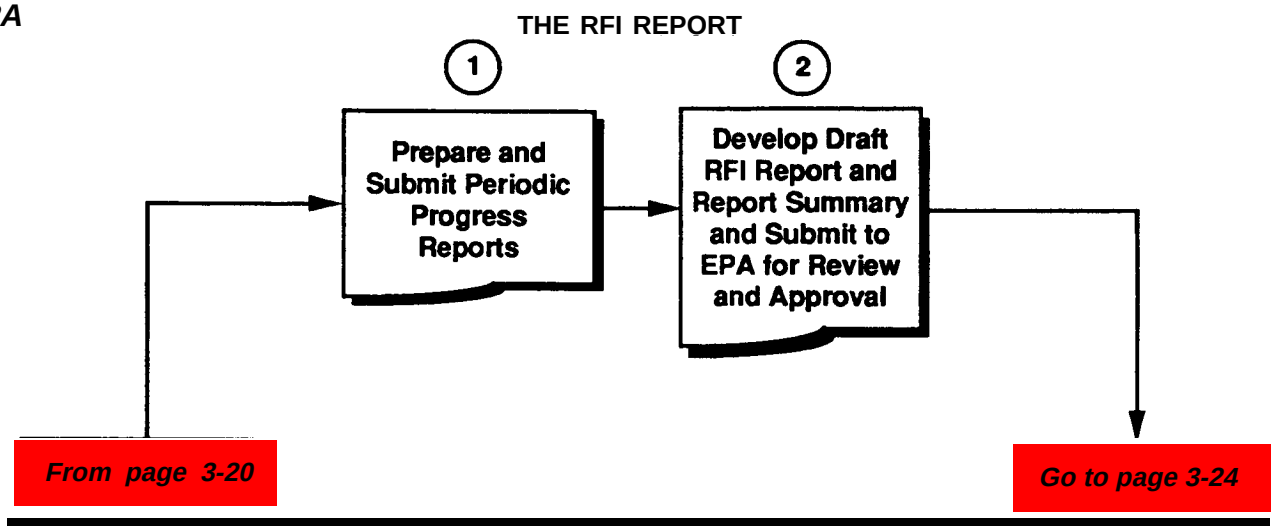

4. **Determine Nature and Extent of Contamination.** Once the source(s) of the contamination is identified, the next step is to determine the nature and extent of the contamination. This process is essentially the same for both RCRA Corrective Action and CERCLA in order to make an informed risk management decision. However, because more information on the specific wastes managed at a RCRA site is usually available, it is possible to narrow the focus of the data collection and site characterization efforts. By contrast, the information collected during this phase of the RI/FS allows informed decisions only on the level of risk presented by the site and the appropriate type of remedial response. Analysis of the physical characteristics of the site, the source, and the identity of the contamination is still necessary to estimate the extent of migration. ***The next step, confirmation of these estimates, often involves sampling and analysis of the affected media.***

a. There are five environmental media of concern: (1) groundwater, (2) soil, (3) surface water, (4) surface water sediments, and (5) air. In addition, sampling of biota may be required. The specific method used to assess the extent of contamination depends upon the medium under examination. While the EPA guidance document, Guidance for Conducting Remedial Investigation/Feasibility Study (RI/FS) under CERCLA (Interim Final), provides general information on the site characterization process, the EPA document A Compendium of Superfund Field Operations (1988) provides detailed guidance on the techniques for assessing the degree of environmental contamination at the site.

b. The extent of **groundwater** contamination must be defined horizontally and vertically. Hydrogeologic studies provide the data necessary to determine if groundwater contamination can affect human or environmental receptors. If such a threat exists, an extensive groundwater monitoring program is usually required to accurately assess the extent of the contamination.

c. Characterization of **soil** contamination is similar to the characterization of groundwater contamination. The objective is to determine the areal extent of the contamination and total quantity of contaminated soil present at the site. However, unlike groundwater investigations, if there is adequate knowledge of contaminant sources, the soil sampling process can be quickly focused on suspected areas of contamination.

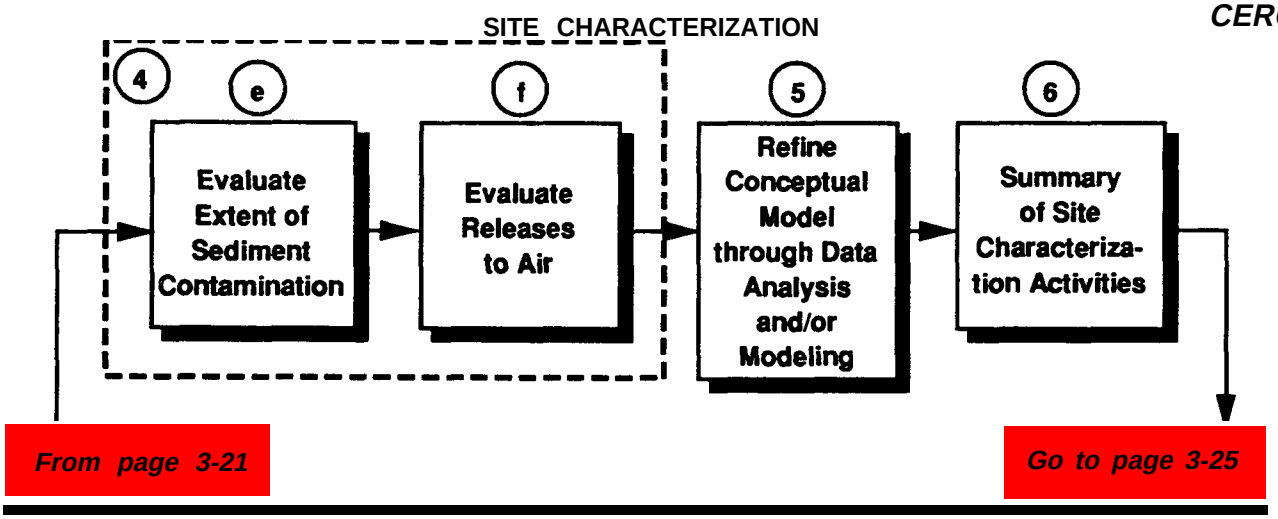
d. The extent of **surface water** contamination due to continuing releases is assessed through sampling at the point of entry into the surface water body and as far downstream as is needed to determine the extent of contaminant migration.




## VII. The RCRA Facility Investigation Report

1. **Periodic Progress Reporting.** While the RFI is under way, under proposed 40 CFR §264.513(a), EPA may require the *submission of periodic progress reports.* The exact content, format, and schedule for these reports are at the discretion of EPA. Any specific requirements for these progress reports will be included in the permit, RCRA §3008(h) Order, or FFCA.

2. **Development and Submission of RFI Report.** Upon completion of the RFI, DOE prepares a draft RFI report and a separate document summarizing the report and submits these documents to EPA for review and approval. The findings of the report are the basis for a "Determination of No Further Action" or for the conduct of a CMS, and represent the culmination of all the effort involved in conducting the RFI. The summary is sent to all parties on the facility's mailing list.



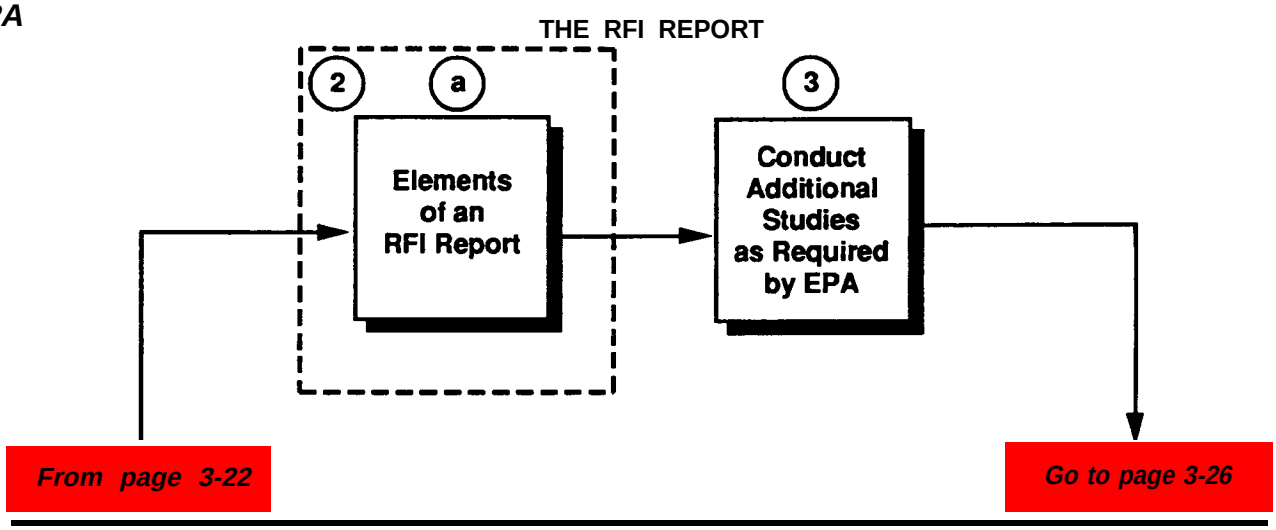

**e.** If surface water is determined to be contaminated, it is likely that the sediments are also contaminated. A sediment sampling program will be similar to a surface water sampling program, requiring sampling at the point of entry and at appropriate intervals downstream. A sediment sampling program will most likely be conducted concurrently with a surface water sampling program to allow analysis of the relationship between surface water hydrology and sediment contamination.

**f.** Characterization of *air* releases due to volatile or particulate emissions will probably be linked to meteorological studies. Until EPA issues new regulations to implement the Clean Air Act of 1990, determining the specific requirements for compliance will require close coordination with EPA and State regulatory agencies.

**5. Refine Conceptual Model.** Once data collection on the physical characteristics of the site, the source of contamination, the nature and extent of the contamination, and the affected media is completed, each data type is analyzed to refine the conceptual understanding of site conditions. In many cases, the process of data analysis will involve modeling the contaminant fate and transport to extrapolate future contaminant migration. Data collection is considered complete when the DQOs developed in the scoping process are fulfilled and sufficient data are available to select a remedial action.

**6. Summary.** In summary, site characterization involves the following:

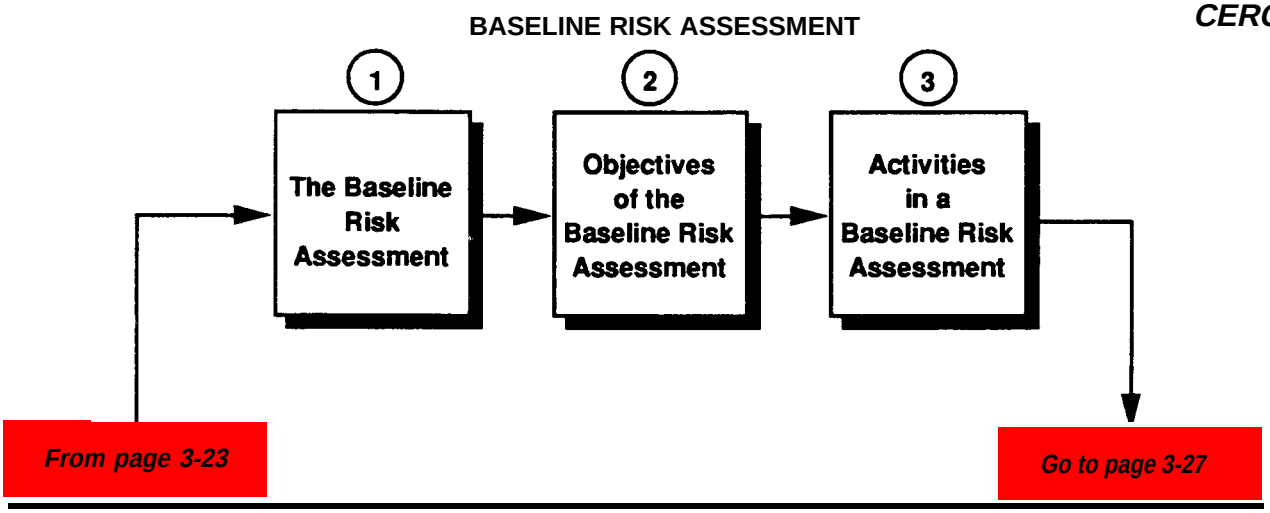
- **Initiate procurement of goods and services,**
- **Investigate the physical characteristics of the site,**
- **Define the source(s) of contamination and assess integrity of containment systems, and**
- **Determine the nature and extent of the contamination and the affected environmental media (i.e., groundwater, soil, surface water, sediments, and air).**




**a.** The RFI report must document the process and findings of the investigation and provide information to support any subsequent decisions. The elements of an RFI report are as follows:

- **A brief discussion of the facility history and current facility conditions, including the terms of the permit. RCRA §3008(h) Order, or FFCA:**
- **A discussion of the general approach to the investigation;**
- **A discussion of the objectives of the investigation and an assessment of the success in achieving each objective;**
- **Identification and discussion of the general, specific, end technical requirements of the RFI;**
- **A discussion of the quality assurance,quality control , and data management procedures utilized during the investigation:**
- **Presentation and discussion of the findings of the investigation;**
- **Comparison of actual contamination levels to action levels;**
- **A discussion of significant problems encountered during the RFI end**
- **Recommendations for subsequent action.**

**3.** **Conduct Additional Studies, If Required.** After review of the draft RFI report, EPA may require DOE to conduct additional investigations or studies. The final, EPA-approved RFI report becomes the basis for either a CMS or a "Determination of No Further Action. "



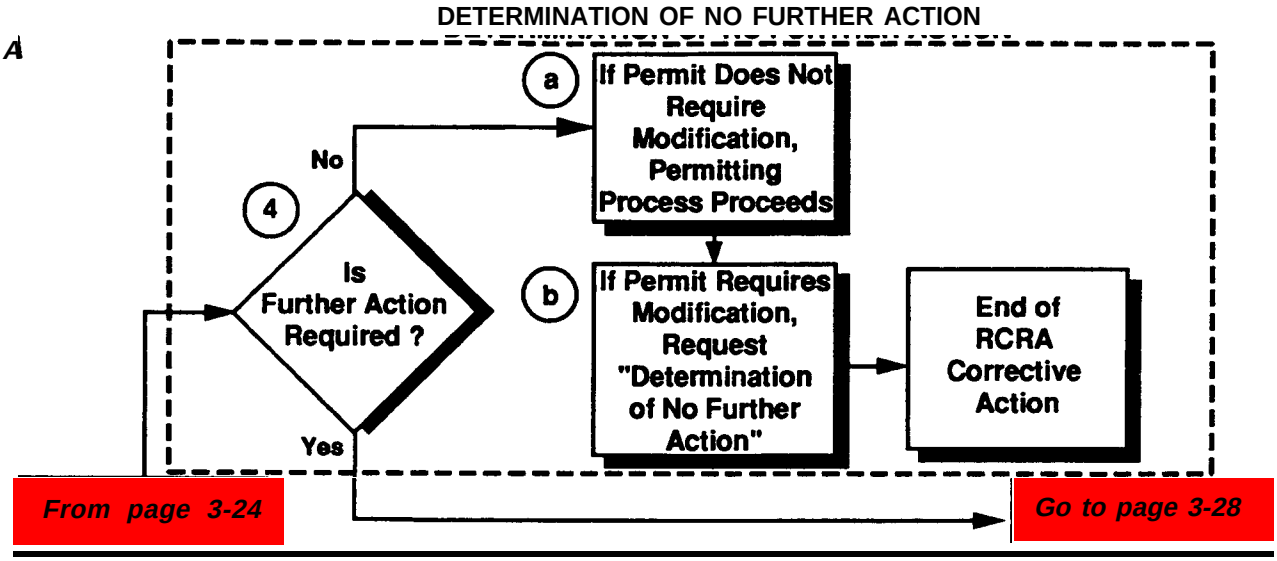

## VIII. Conducting the CERCLA RI: Baseline Risk Assessment

1. **The Baseline Risk Assessment.** A baseline risk assessment evaluates the potential threat to human health and the environment posed by the site. The level of risk posed by the site is one element in making an informed risk management decision regarding the need for a remedial action. EPA has published a detailed guidance document on conducting baseline risk assessments entitled *Risk Assessment Guidance for Superfund, Volumes 1 and 2 (Interim Final,* 1989). The RCRA Corrective Action program uses a process very similar to a CERCLA risk assessment to determine the need for interim measures and to set action levels or media cleanup standards for contaminants without promulgated standards.

2. **Objectives of the Baseline Risk Assessment.** According to the EPA RI/FS guidance, the principal objective of the baseline risk assessment is collection of sufficient data to identify and characterize the following:

- **The concentrations and toxicity of contaminants present in each media,**
- **The environmental fete end transport mechanisms of these contaminants,**
- **Potential human and environmental receptors,**
- **Potential exposure routes and the extent of actual or potential exposure,**
- **The extent of expected impacts end the likelihood of such impacts occurring, and**
- **The level of uncertainty of the baseline risk assessment.**

3. **Activities in a Baseline Risk Assessment.** As described in Section 3.4.2 of the EPA RI/FS guidance, conducting a baseline risk assessment requires these basic activities: (a) contaminant identification; (b) exposure assessment; (c) assessment of the acute, chronic, and carcinogenic toxicity of the contaminants; and (d) risk characterization.

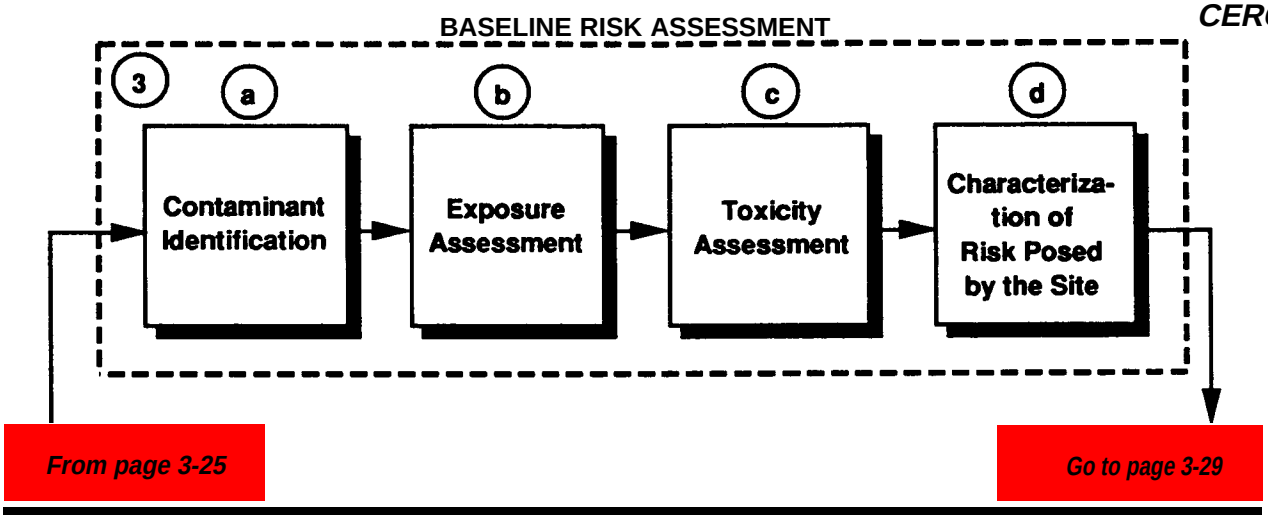



## IX. RCRA Determination of No Further Action

**4.** **Need for Further Action?** EPA anticipates that at some facilities the releases at SWMUs identified through the RFA (or subsequent investigations) are not a threat to human health and the environment. If EPA conducted the RFI and discovered no release orthreatened release, then no further action is required at that SWMU, and the facility permit application continues through the normal process.

**a.** However, if a RCRA §3008(h) Order or an existing permit required DOE to conduct the RFI, DOE must request termination of the investigation requirement in the facility schedule of compliance. This requires a Class Ill permit modification, or rescission of the RCRA §3008(h) Order.

**b.** Permit modification for a “Determination of No Further Action,” as outlined in the proposed Subpart S rule at 40 CFR §264.514, requires negotiation of the modification with EPA, development of a draft permit, a public notice, a comment and response period, a public meeting (if necessary), incorporation of any revisions into the permit modification, and issuance of the final modified permit. For a RCRA §3008(h) Order, EPA merely rescinds the order. In either case, DOE is responsible for providing any supporting documentation.

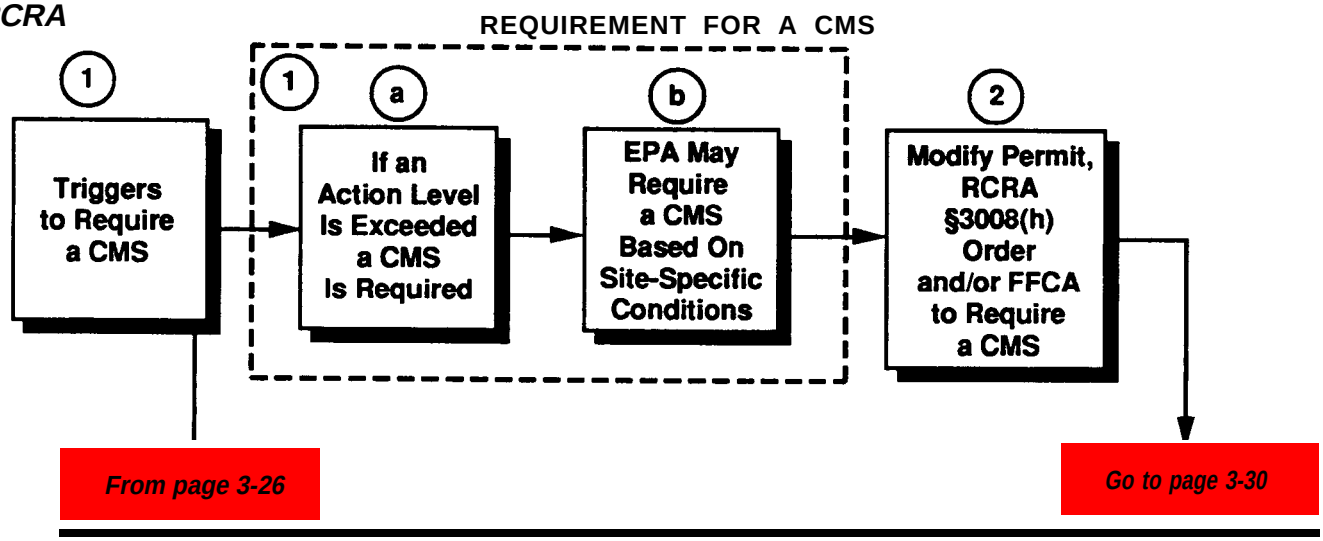



**a.** ***Contaminant identification*** consists of identifying those compounds posing the greatest concerns, especially the risk to human health and the environment. Contaminants of concern may be selected based on factors including their toxicological properties, quantities, or presence in critical exposure pathways.

**b.** ***Exposure assessment*** consists of identifying the actual or potential pathways of exposure. This consists of determining the migration pathways from the source to the receptor. Each migration pathway has four elements to investigate: (1) the source and mechanism of release; (2) the environmental transport medium; (3) the point where exposure occurs (referred to as the exposure point); and (4) the exposure route (e.g., inhalation, ingestion). The specific activities of an exposure assessment are described in detail in Chapter 6 of the EPA guidance document *Risk Assessment Guidance for Superfund, Volume 1 (Interim Final 1989).*

**c.** ***Toxicity assessment*** relies upon existing information about the acute, chronic, and carcinogenic effects of exposure. Examples of information collected during this step of a baseline risk assessment include carcinogenic potency factors (CPFs) or reference doses (RfDs). This information is available through EPA's Integrated Risk *information System, a* data base of health risk and regulatory information, as well as other sources. Additional information on toxicity assessment can be found in Chapter 7 of the EPA guidance document *Risk Assessment Guidance for Superfund, Volume 1 (Interim Final, 1989).*

**d.** The final step in the baseline risk assessment is the actual ***characterization of the risk*** posed to human health and the environment. Using the information from the identification, exposure, and toxicity assessments, this step integrates all this information to provide an estimate of the risk posed to human health and the environment. For non-carcinogenic substances (e.g., acute and chronic exposure), the "point of departure" is that no adverse effects will be seen in a lifetime of exposure. For carcinogenic compounds, the "point of departure" of developing cancer is in the range of 1 additional incidence of cancer in 10,000 persons to 1 additional incidence in 1,000,000 persons based upon a lifetime of exposure (often expressed as a 1 $x10^{-4}$+ to 1 $x1O^{-6}$ excess lifetime risk). Specific information on this process can be found in Chapter 8 of the EPA guidance document *Risk Assessment Guidance for Superfund, Volume 1 (Interim Final, 1989).*



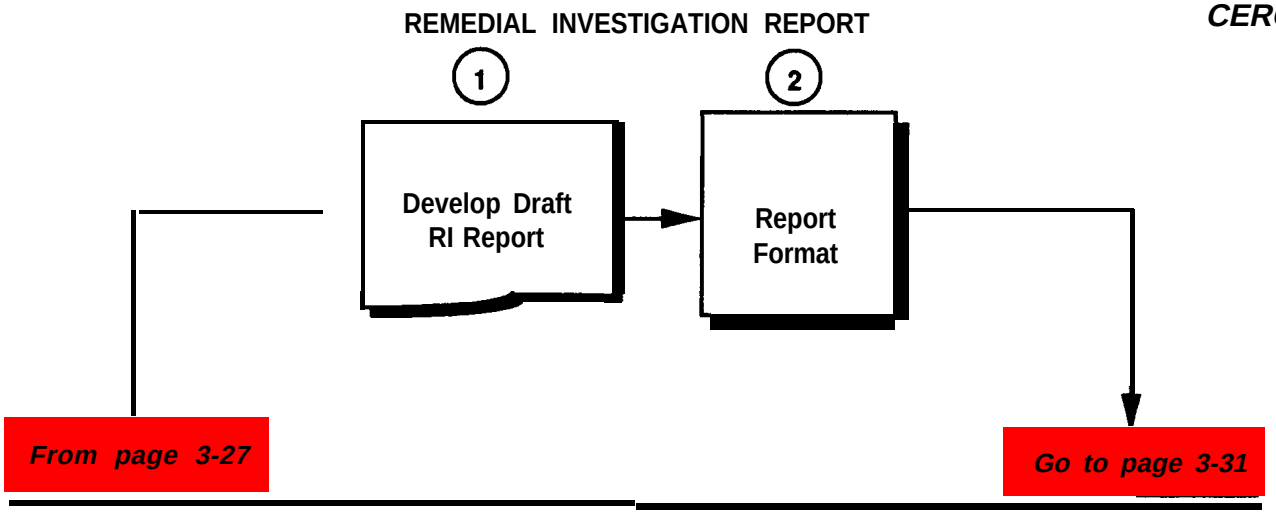

## X. Requirement for a RCRA Corrective Measures Study

1. **Triggers for a Requirement To Conduct a CMS.** There are two mechanisms triggering the requirement for a CMS.

a. The primary mechanism for triggering a CMS (proposed 40 CFR §264.520[a]) is the discovery that the ***concentration of a contaminant released from an SWMU exceeds the action level set for that contaminant.*** Action levels are media-specific health and environmental-based contaminant concentrations considered protective of human health and the environment. Action levels are often standards issued under other statutes, such as the Maximum Contaminant Levels under the Safe Drinking Water Act. It must be noted that action levels do not necessarily represent the final concentrations that must be achieved through the implementation of a corrective measure. Action levels act as a presumptive contaminant concentration level, which, if exceeded, require the permittee to perform additional investigations, specifically the CMS.

b. The second mechanism for triggering a CMS (proposed 40 CFR §264.514[bl) allows EPA to require a CM S even when ***contaminant concentrations are below action levels but where other site-specfic considerations,*** such as impacts to sensitive environments, suggest a need for close evaluation of the need for remediation of the contamination.

2. **Formal Requirement Issuance.** Unless already specified in the facility permit or a RCRA §3008(h) Order compelling Corrective Action, conduct of a CMS requires a Class II modification of the facility permit or issuance of an additional RCRA §3008(h) Order. Permit modification requires negotiation of the modification with EPA, development of a draft permit, a public notice, a comment and response period, a public meeting (if necessary), incorporation of any revisions into the permit modification, and issuance of the final modified permit. For an interim status facility, EPA issues a RCRA §3008(h) Order requiring DOE to conduct a CMS.

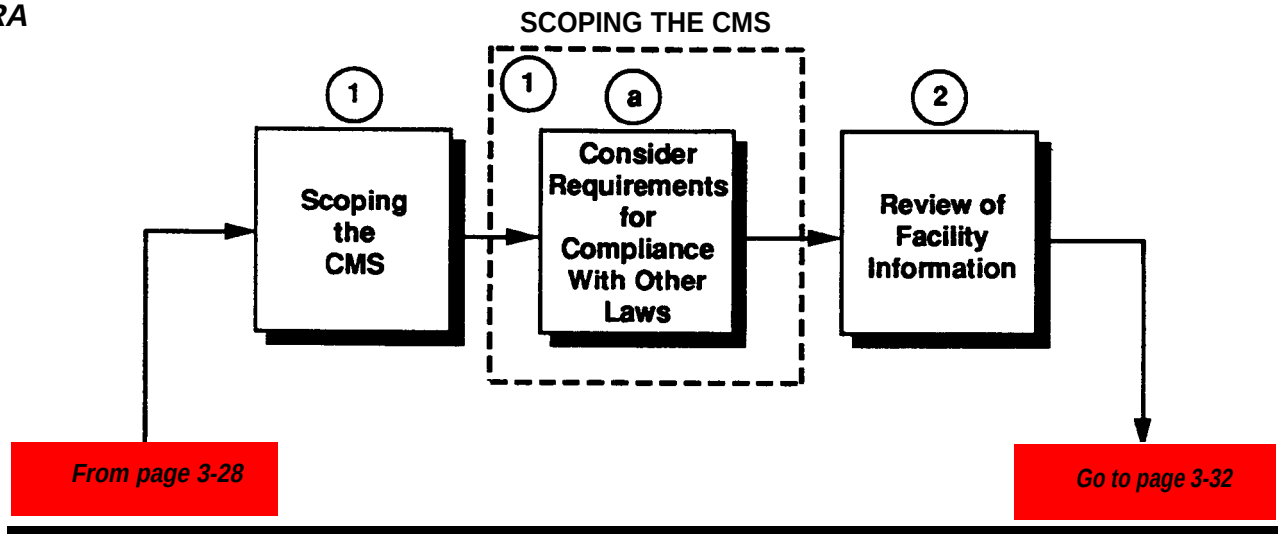



## XI. The CERCLA Remedial Investigation Report

1. **Develop Draft RI Report.** Once the site characterization process is completed, DOE should develop a draft RI report to submit for EPA review. The RI report should be developed following completion of the baseline risk assessment and before starting to develop the draft FS report. Developing the RI report should not delay initiation or execution of the FS.

2. **RI Report Format.** A draft RI report format is provided in the EPA document *Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) Under CERCLA (1988).* For a more detailed discussion of these elements, see the sections of this chapter on scoping, site characterization, and conducting the baseline risk assessment. The suggested format for the RI report is as follows:

- **Introduction a discussion of the purpose of the report and site background,**
- **Study Area investigation-a discussion of all field activities conducted during the RI and any technical documentation prepared that relates to field activities,**
- **The Physical Characteristics of the Study Area – a discussion of the physical characteristics of the site determined during field investigations (e.g., topography, contaminant sources, receptors),**
- **Nature and Extent of Contamination -- a discussion of the results of the site characterization including discussion of both the natural conditions and the contamination present at the site,**
- **Contaminant Fate and Transport - identification of the potential routes of contaminant migration and discussion of the persistence of the contaminants in the environment and the ability of the contaminants to migrate,**
- **Baseline Risk Assessment – a discussion of the supporting data and the actual or potential risk to human health and the environmental evaluation posed by the site,**
- **Summary and Conclusions – a summary of the above data and recommendations for remedial action objectives, and**
- **Appendices.**




## XII. Scoping the RCRA Corrective Measures Study

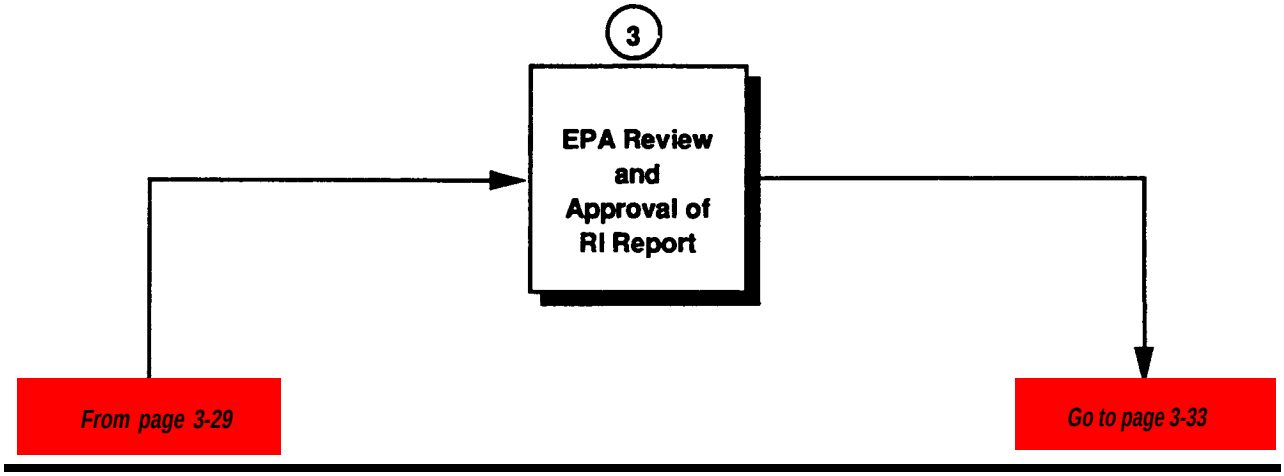
1. **Scoping a CMS.** As discussed in the DOE *RCRA Corrective Action Program Guide,* there are six basic steps to scoping a CMS: (1) reviewing existing information about conditions at the facility, (2) determining if a phased remedy or CAMUs are appropriate, (3) streamlining the CMS (as appropriate), (4) defining the objectives of the CMS, (5) establishing the process and criteria for evaluating the alternatives for the corrective measure, and (6) selecting candidate corrective measures for evaluation.

a. In addition, during the scoping process the facility should consider any requirements for compliance with other statutes. Examples include requirements relative to CERCLA, the Clean Water Act (CWA), and the Clean Air Act (CAA).

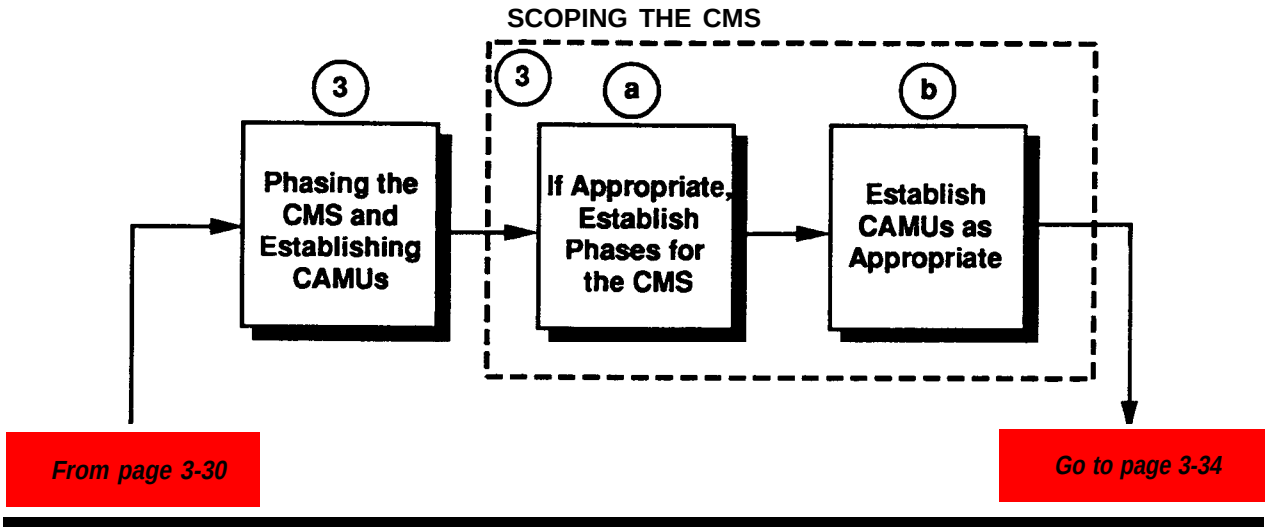
2. **Review of Facility Information.** The first step in the CMS process is to ***review information*** about the SWMU and the release from the SWMU. Most of this information is in the RFI report. Additional information may come from review of other sources, such as reports of releases, the RFA report, and interim measures reports. Specific information sought during this review includes the following:

- **Contaminant characteristics including identity, physical, chemical, and toxicological properties, and quantity or concentration;**
- **Environmental setting including the impacted media, information on geology, hydrogeology, topography, population demographics; the relation of the SWMU to other SWMUs at the facility; and the relationship of the facility to the surrounding area;**
- **Evaluation of the risks posed to human health and the environment by the release;**
- **Actions taken to control or minimize the threat posed by the release; and**
- **Current conditions at the facility.**

REMEDIAL INVESTIGATIVE REPORT



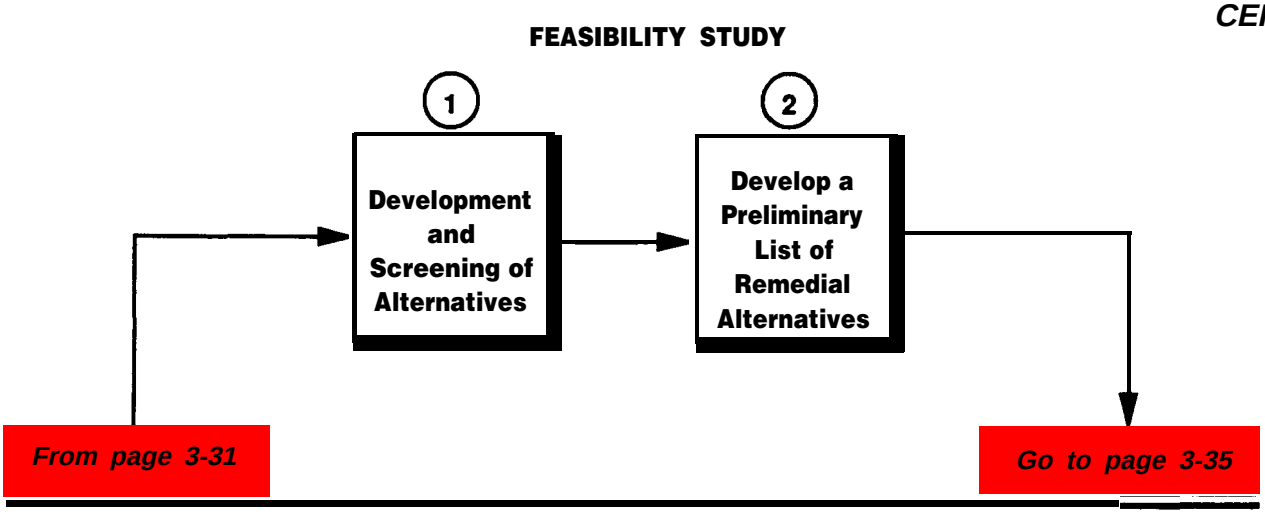

3. **EPA Review and Approval of RI Report.** EPA will review the draft RI report. If EPA does not approve the draft Ri report, EPA may direct DOE to conduct additional investigations.




3. **Phasing Corrective Measures and Establishing CAMUs.** The second step of the scoping process is to evaluate the usefulness of a phased corrective measure and the potential benefits of establishing CAMUs.

a. For complex sites where cleanup of the entire facility in a single action is impractical, under proposed 40 CFR §264.526(d) EPA can divide the corrective measure into phases. Phasing of a corrective measure is similar to the use of "operable units" under CERCLA and represents any logically connected set of actions performed sequentially over time or concurrently at different parts of the facility. If a phased corrective measure is appropriate at the facility, the CMS may also be broken into phases, with each phase of the CMS focusing on a particular phase of the corrective measure. Ideally, using a streamlined approach, a phased CMS requires consideration of the remedial alternative for the individual phase *and* the ultimate remedial goals for the entire facility. Any phased corrective measure should complement, not impede, future remedial activities at the facility.

b. Another consideration for the scoping process is the **use of *CAMUs.*** Under the recently promulgated CAMU regulations (58 FR 8658, February 16, 1993), EPA can designate an area at a facility used to manage remediation wastes as a CAMU. The use of CAMUs permits management, treatment, and disposal of remediation wastes in the CAMU without LDR or MTR compliance. The identification of a CAMU usually takes place during the selection of the corrective measure, but the evaluation of potential CAMUs and designation of areas as CAMUs should occur during the RFI and/or CMS. If CAMUs have not been designated prior to the CMS, DOE should consider proposing any appropriate areas as CAMUs. The primary benefit of using a CAMU at a facility is that management of remediation wastes within the CAMU during corrective action is not subject to either the land disposal restrictions or the minimum technology requirements for a new TSDF unit or the lateral expansion of an old unit.

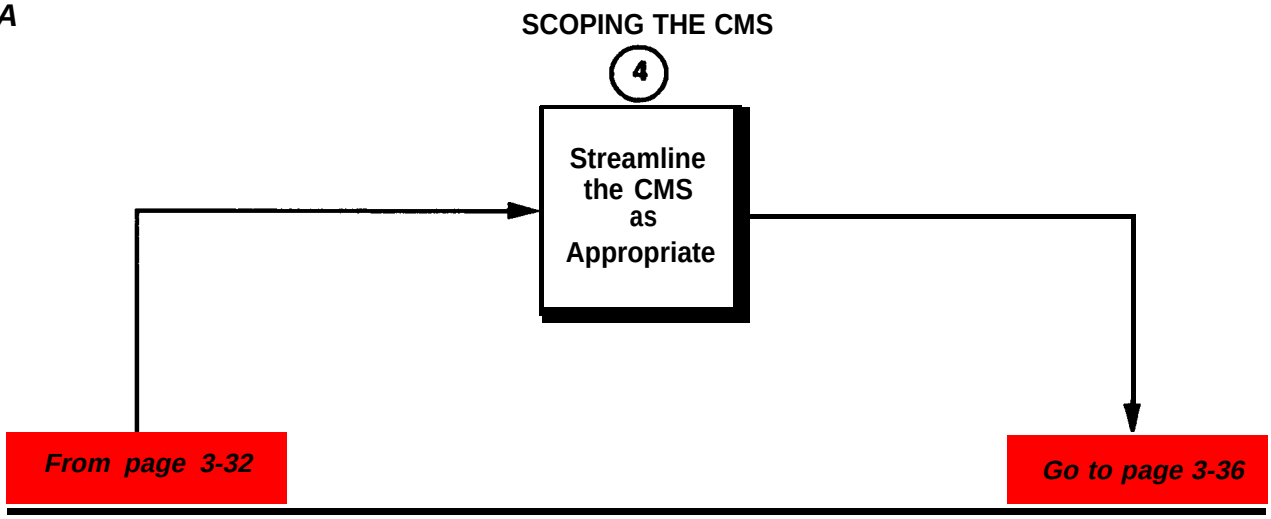



## XIII. CERCLA Feasibility Study: Development and Screening of Alternatives

1. **Development and Screening of Alternatives.** The objective of this phase of the R1/FS is to develop a preliminary list of remedial alternatives for the site. This list should be refined based upon information gathered from the site characterization and the results of any treatability studies conducted during later phases of the RI/FS. A more detailed discussion of this process is found in Chapter 4 of the EPA RI/FS guidance.

2. **Develop a Preliminary List of Remedial Alternatives.** The process of developing a preliminary list of alternatives for the remediation of a site is accomplished through a six-step process:

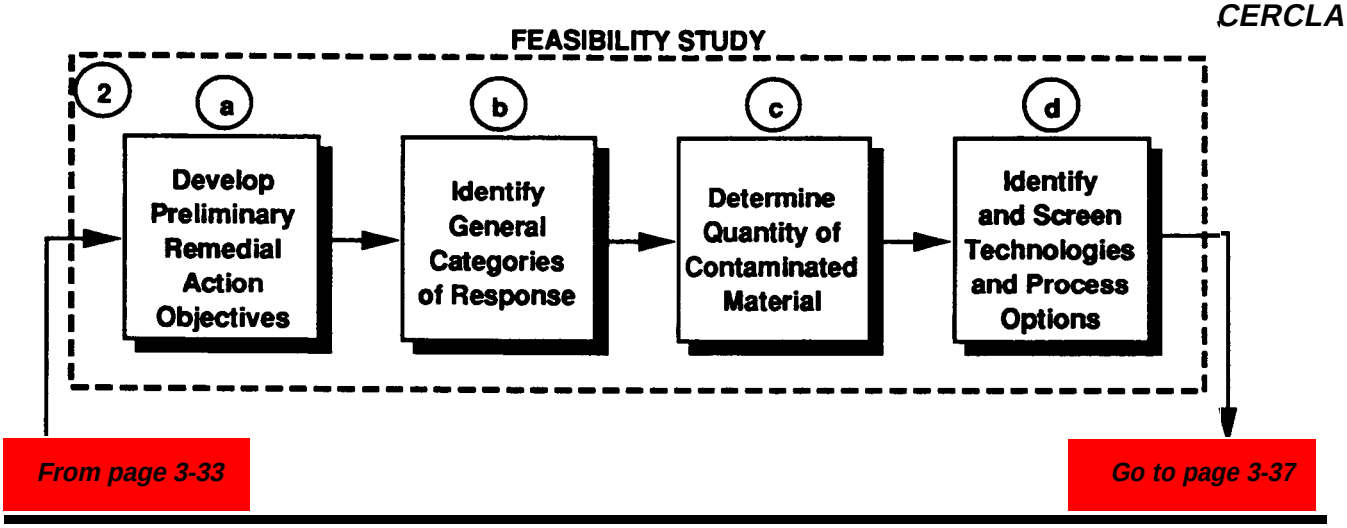
- **Development of preliminary remedial action objectives reflecting the requirements for compliance with ARARs and other considerations, such as the findings of the baseline risk assessment;**
- **Identification of general categories of responses applicable to each medium of concern {e.g., incineration, pump-and-treat);**
- **Determination of the quantity of contaminated material that must be treated and determination of those remedial alternatives that are technically impractical given site conditions;**
- **Identification of applicable technologies within each category of remedial alternatives identified (e.g., for the general class of incineration, specific process options include fluid bed incineration, rotary kiln incineration):**
- **A more detailed evaluation of the various technologies to reduce the number of alternatives in each category to a single technology: and**
- **If appropriate, assembly of the selected alternatives into a range of treatment and containment combinations.**




4. **Streamlining the Corrective Measures Study.** In scoping the CMS, the next step is determining whether a ***streamlined CMS*** is appropriate. Streamlining, as discussed in the preamble to the proposed Subpart S rule (55 FR 30821), involves tailoring the CMS to the complexity and scope of the situation at the facility. This process is similar to the observational approach used for CERCLA R1/FS. There are several advantages to a streamlined CMS. The most important of these is that a streamlined CMS may not require extensive evaluation of numerous alternatives for the corrective measure. A streamlined CMS is appropriate for sites with the following types of conditions:

- **The facility poses a low overall risk due to small areas of low-level contamination, which pose minimal exposure risk;**
- **DOE proposes a highly protective corrective measure, such as a RCRA clean closure;**
- **Because of site conditions, there are few alternatives for the corrective measure as justified by proposed 40 CFR §264.531, Technical Impracticability;**
- **Expected future use of the site dictates a highly protective degree of cleanup;**
- **The remedial solution is straightforward and will use a tested and proven remedial technology: or**
- **Use of a phased remedy.**

According to the preamble to the Subpart S proposed rule (55 FR 30821, July 27, 1990), the use of streamlined CMS is not appropriate for large, complex, “high risk” facilities, which may have large volumes of both contaminated wastes and soils and, for which several different treatment and containment systems technologies could be applicable. Likewise, a streamlined CMS may not be appropriate for contamination problems, for which there are very different technical approaches to remediating contamination problems at a facility, which would be implemented over different time frames and which would have varying degrees of long-term reliability.



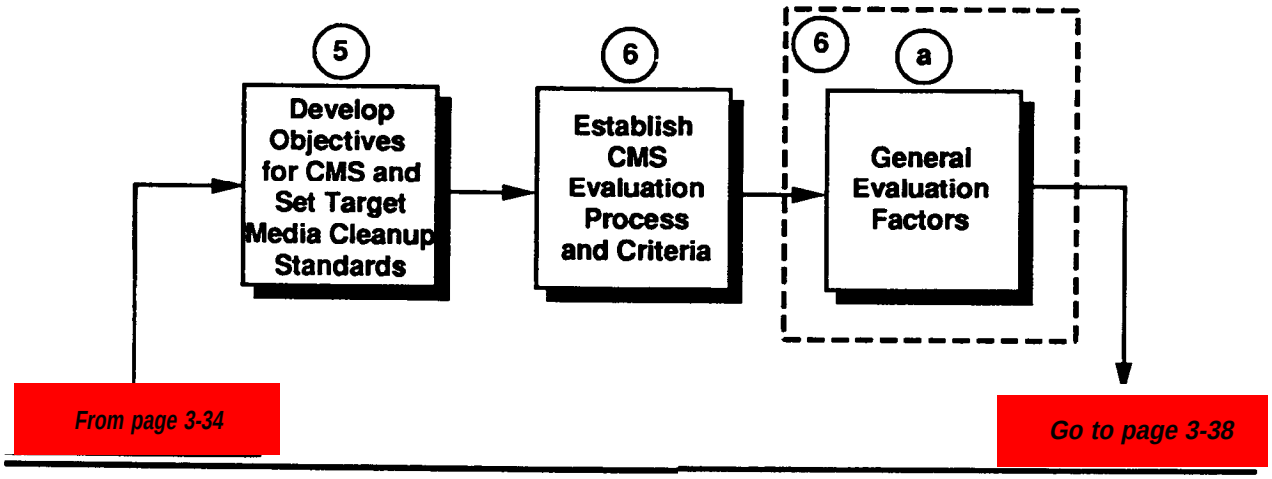

**a.** The first step in the preliminary identification of remedial alternatives is the **development of preliminary remedial action objectives.** The objectives for the remedial action are operable unit-specific cleanup goals that are protective of human health and the environment. Such goals are usually based upon existing information, such as ARARs, or available toxicological information.

**b.** The second step in the development and screening of alternatives is to **identify general categories of response** actions that will meet or exceed the cleanup goals. Examples of general categories of response actions include incineration, containment, excavation, or institutional controls specific to the contaminated media at the site.

**c.** The next step is to determine or estimate the **quantity of contaminated material** present at the site. A determination of the volume of contaminated material requiring remedial action is essential to the screening process. If the volume of the contaminated material is extremely large, some remedial alternatives may be technically impractical. This determination will allow those remedial alternatives incapable of treating the necessary quantity of contaminated material in a reasonable time frame to be dropped from consideration. The determination of the volume of contaminated material also allows decisions about the types of response required.

**d.** The fourth step is to identify and screen **technologies and, within a class of technologies,** options for the actual treatment process. This step screens the general categories of remedial alternatives by examining the technical implementability of specific remedial technologies in each category. Identification of specific technologies is accomplished through literature review and review of remedial actions at other CERCLA response sites. If a specific technology is determined to be technically impractical based upon the information collected during this review, it is eliminated from further consideration.

SCOPING THE CMS

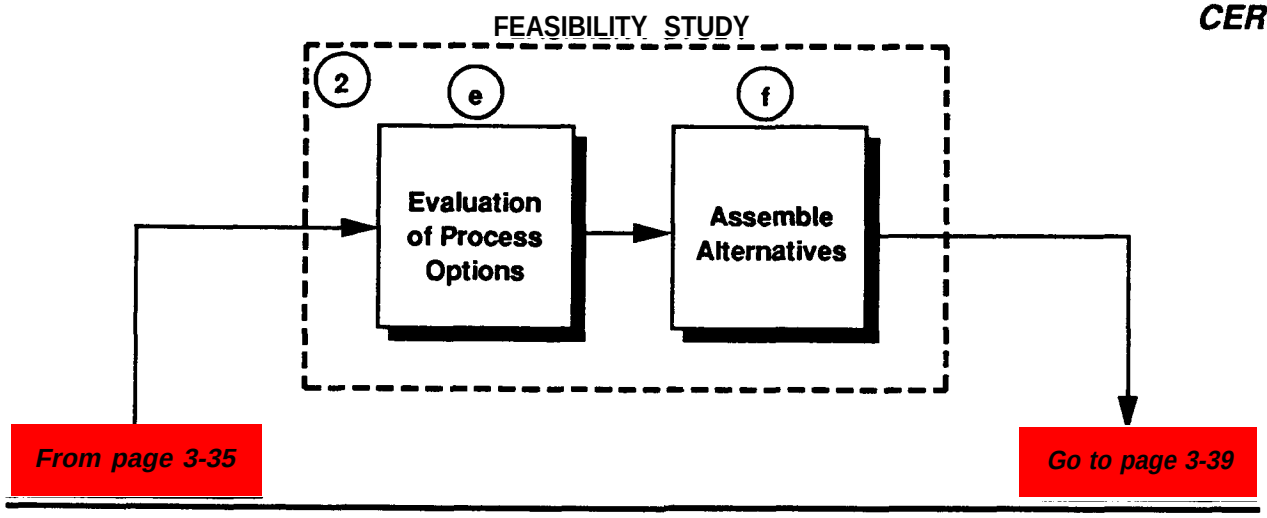



5. **Developing Objectives for the Corrective Measures Study.** The fourth step in the scoping process is developing the objectives of the CMS, primarily through ***establishing target media cleanup standards (MCS).*** As opposed to action levels, which are contaminant concentrations used to determine the need for a CMS, MCS are media-specific constituent concentrations that the corrective measure must achieve. The final MCS are set during the remedy selection process; however, setting target MCS provides an extremely useful tool for evaluating alternatives for the corrective measure. EPA is not required to set, and retains the authority to revise, such target MCS. However, DOE should try to negotiate with EPA for the creation of target MCS for the facility. If EPA is unwilling to set target MCS for the facility, DOE should consider developing its own target MCS for use in evaluating the alternatives for the corrective measure.

6. **Establishing the Corrective Measures Study Evaluation Process and Criteria.** The fifth step in scoping the CMS is to ***establish the process and criteria for evaluating each alternative*** for the corrective measure. The CMS evaluation process and criteria should reflect the general evaluation factors for a CMS. The process and criteria should also reflect the standards and specific factors against which each alternative corrective measure will be judged during the final remedy selection process.

a. The general evaluation factors for a CMS are as follows:

- **Performance, reliability. ease of implementation, and potential impacts from each alternative corrective measure;**
- **Effectiveness of each alternative in achieving adequate source control;**
- **Time required to begin and complete each alternative corrective measure;**
- **Costs of each alternative; and**
- **Institutional requirements (e.g.. State. local, or public health regulations or permitting requirements) that might impact the implementation of each alternative.**

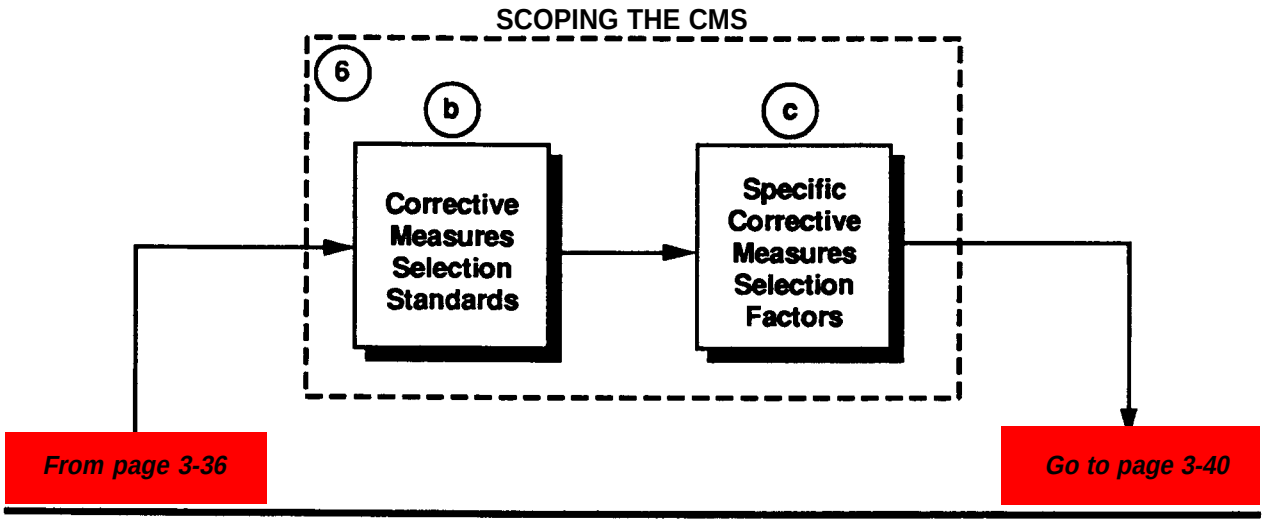



**e.** This fifth step is a more detailed ***evaluation of the various process options.*** In this step, each remedial alternative is screened even further to reduce the number of alternatives in each category of remedial technology to a single process option. The purpose of this step is to select an alternative. The evaluation criteria used in this process are the same as for the detailed analysis of alternatives (effectiveness, implementability, cost, etc.), but are applied to the individual technologies under consideration, without regard for the need for remedial action at the site as a whole.

The principal factor used in this evaluation is effectiveness. To assess the effectiveness of a given remedial alternative, one must assess the following:

- **The effectiveness of each alternative in treating the estimated volume and concentration of the contaminated media,**
- **The potential impacts to human health and the environment during implementation, and**
- **The reliability of the alternative given site conditions and contaminant concentrations.**

**f.** The final step is to ***assemble the alternatives.*** On the basis of the screening of the general categories and the process options for the various remedial alternatives selected within each category, the selected remedial alternatives are combined to form alternatives that address the site as a whole. For example, if a site had both contaminated soils and contaminated groundwater, the combined alternative could be to excavate and incinerate the soil and then to conduct a groundwater pump-and-treat operation.



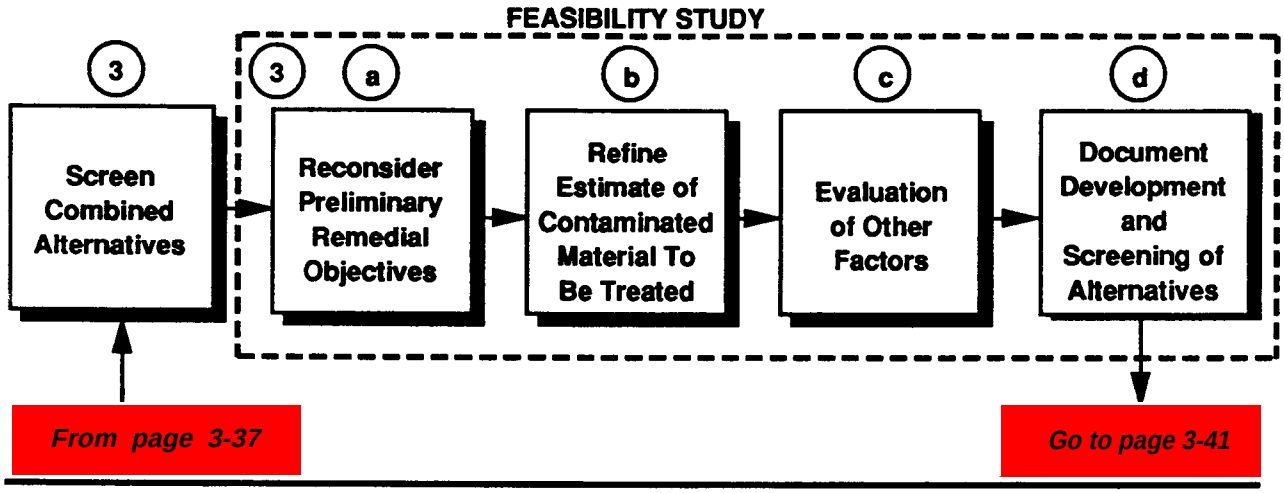

**b.** In rating each alternative for the corrective measure under these general evaluation factors, it is advisable to address each of the four standards for corrective measures and the five corrective measures selection factors. Under proposed 40 CFR §264.525(a), a corrective measure *must* do the following:

- **Be protective of human health and the environment,**
- **Attain final (es opposed to target) MCS,**
- **Provide source control to reduce or eliminate further releases that may pose a threat to human health end the environment, and**
- **Comply with the standards for management of wastes generated as part of oonducting the corrective measure.**

**c.** The five specific selection factors for the corrective measure, set forth in proposed 40 CFR §264.525(b), are as follows:

- **Long-term reliability (greater than 30 years);**
- **Reduction of toxicity, mobility, end volume of the contaminants at the facility;**
- **Short-term effectiveness;**

  **Ease of implementation and implementability and**
- **Cost.**



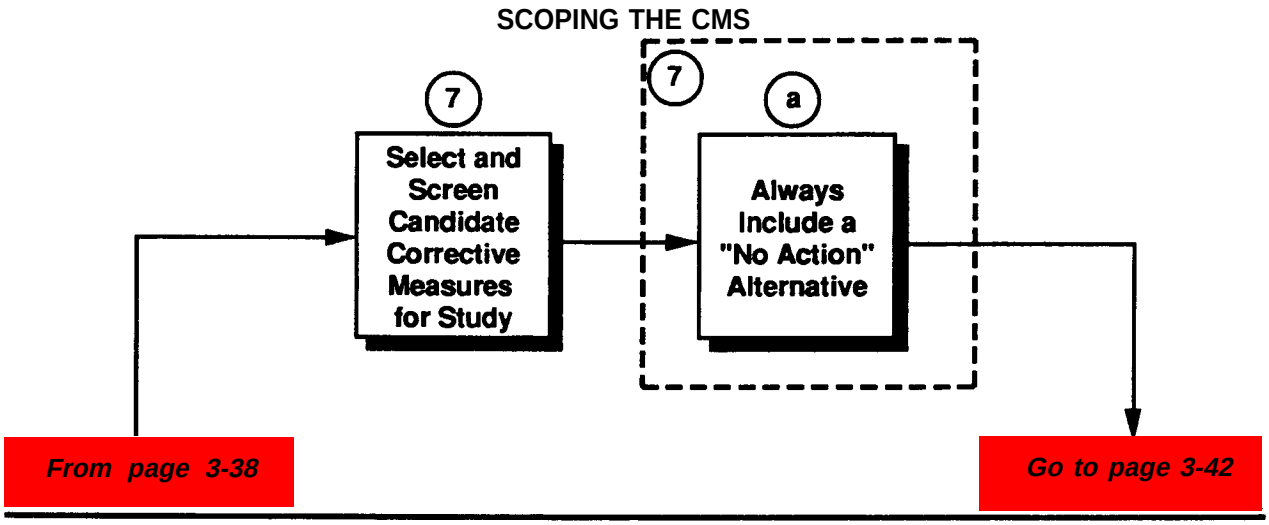

3. **Screen Combined Alternatives.** Once the remedial alternative development process is complete, additional ***screening should be conducted to assess the effectiveness of each altemative*** when considering media interactions, site-wide objectives for protection of human health and the environment, details of the specific operational requirements of each alternative, and other factors.

a. The first step in the screening process is to ***reconsider the preliminary remedial action objectives*** and to determine if each remedial alternative is able to achieve these objectives.

b. The second step in screening is to further ***refine the estimate of the quantity of contaminated material*** *present* at the site and to determine if each remedial alternative is capable of treating this volume of media in an appropriate time frame.

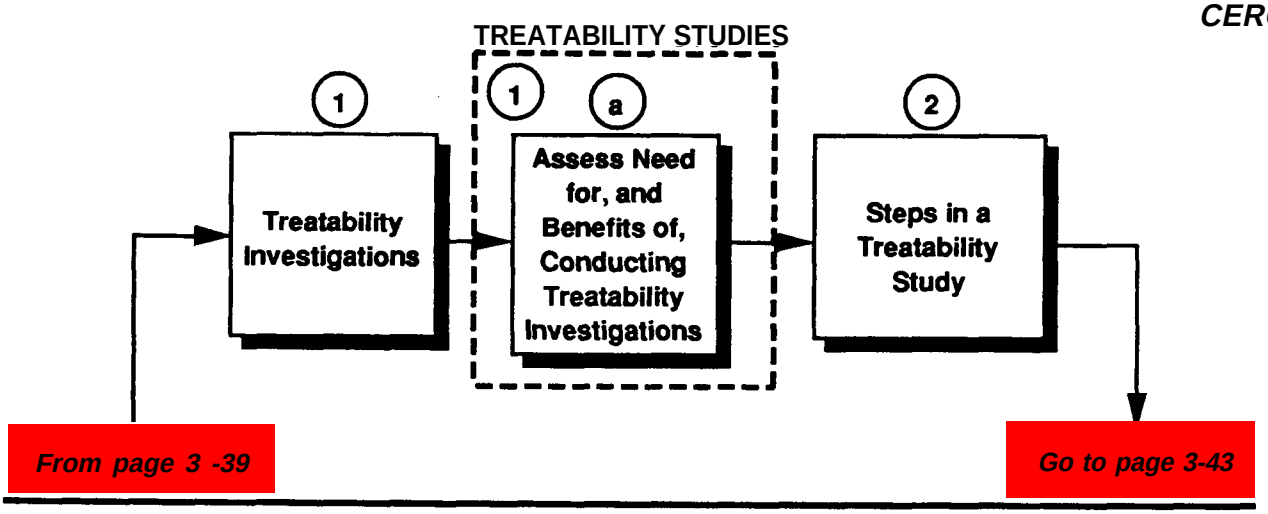
c. The third step in the screening process is to ***examine other factors*** impacting the implementability, cost, or effectiveness of each remedial alternative. Examples of considerations for this evaluation include the unit size and space requirements, permitting requirements for offsite disposal of wastes generated by the remedial action, the cost of construction of the remedial alternative, and the rate at which the alternative can treat the contaminated material.

d. Although no formal report on the development and screening of remedial alternatives is required under the National Oil and Hazardous Substances Pollution Contingency Plan (NC P), the EPA RI/FS guidance recommends that once the alternatives are screened and a final list of remedial alternatives is reached, DOE should develop a ***document detailing the evaluations and screening decisions*** made during the screening process. This document should also provide a detailed description of each alternative selected for detailed evaluation. This could be a letter report that would become a section or chapter of the FS.




**7.** **Select and Screen Candidate Corrective Measures for Study.** The sixth step in scoping a CMS is to ***develop a list of candidate alternatives*** for the corrective measure. The list of candidate alternatives is developed through analysis of facility conditions and review of information on existing and innovative remedial technologies applicable to the problems at the facility. In addition to the list of alternatives developed by DOE, under proposed 40 CFR §264.522(b) EPA has the authority to specify remedial alternatives for consideration and study. Following the review of existing information on the candidate alternatives, it is possible to eliminate from consideration any alternative that is impractical or inappropriate to site conditions.

**a.** The final list of alternatives for the corrective measures should always include a “no action” alternative. While selection of a “no action” alternative provides no active remediation of contamination, it is useful as a baseline for comparison of the other alternatives. Further, selection of a “no action” alternative may be justified in some cases. For example, the CMS may show that natural attenuation will result in achieving the MCS. A “no action” alternative may also be appropriate if DOE can show that no additional reduction of the risk posed to human health and the environment will result from conducting a corrective measure. A media-specific example for possible justification of a “no action” alternative is a contaminated aquifer that does not, and will not, impact a source or potential source of drinking water. Under proposed 40 CFR §264.525 (d)(2)(ii) of the proposed Subpart S rule, EPA may elect not to require remediation to the MCS if DOE can show that the contamination is not a threat to a current or potential source of drinking water or to environmental receptors.




## XIV. CERCLA Treatability Studies

1. **Treatability Investigations.** As described in Chapter 5 of the EPA RI/FS guidance and in the EPA guidance document titled *Guide for Conducting Treatability Studies Under CERCLA (Interim Final),* ***treatability studies*** are conducted to do the following:

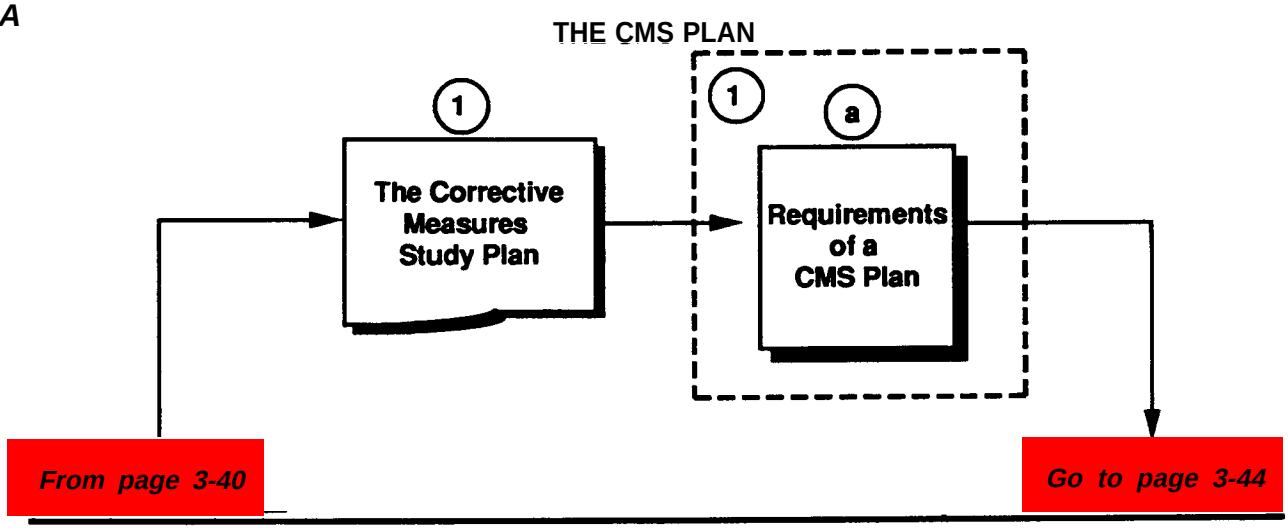
- **Provide sufficient data to fully assess the suitability of each remedial alternative that passed the screening process,**
- **Support the remedial design of the selected alternative, and**
- **Reduce costs and performance uncertainties to allow en informed selection of the remedial action to be performed at the site.**

Under RCRA Corrective Action, treatability studies are conducted during the CMS but are not identified as a separate step in the process.

**a.** Treatability investigations are not required in every case. If sufficient information exists to allow an accurate evaluation of each remedial alternative without conducting treatability studies, DOE should ***weigh the cost and time of conducting treatability investigations*** against the benefits of conducting such investigations.

2. **Steps in a Treatability Study.** A treatability study consists of the following five steps:

- **Determining data needs;**
- **Reviewing existing information on the site end the selected technologies;**
- **Conducting studies of treatability elements;**
- **Performing bench- and pilot-scale tests (as appropriate) to determine the operating parameters, effectiveness. and cost of each alternative: and**
- **Evaluating all data collected during the treatability study to ensure data needs have been met.**

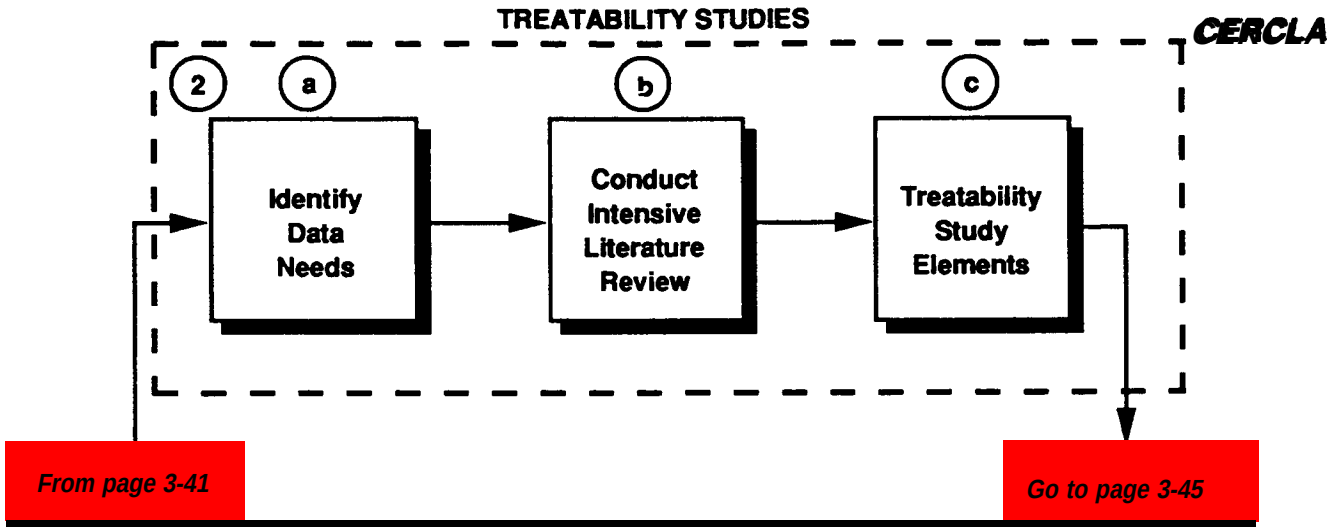



## XV. The RCRA Corrective Measures Study Plan

1. **The CMS Plan.** Conducting a CMS includes the development of a CMS plan. Under the proposed Subpart S rule (proposed 40 CFR §264.523, EPA may require the Plan to follow specific criteria, may include development of the plan in the facility permit schedule of compliance, or may require that the plan be subject to EPA review and approval. Further, under the proposed rule, a requirement for the submission of a CMS plan is at the discretion of EPA. Plan submission is not mandatory. However, if EPA requires submission of a plan, the approved plan becomes a part of the facility permit and is subject to the permit schedule of compliance.

a. The CMS plan requires discussion of the following:

- **Current conditions at the facility,**
- **The general approach to investigating and evaluating alternatives for the corrective measure (e.g., use of a phased remedy or streamlined approach).**
- **Description of the overall objectives of the CMS.**
- **A proposed schedule for the CMS,**
- **Identification of the alternatives for the corrective measure.**
- **The evaluation process and evaluation criteria for each alternative, and**
- **The format for presentation of the findings of the CMS.**



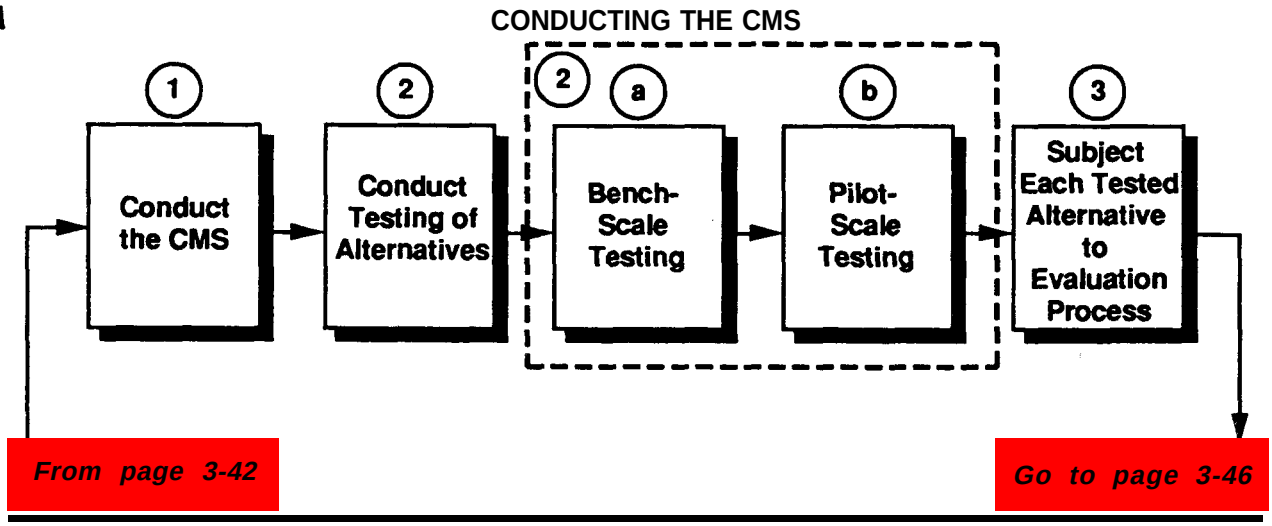

**a.** The data required to conduct treatability studies should, to the extent possible, be collected during the site characterization. However, because of the iterative nature of the RI/FS, specific ***data needs*** are not always known at the time of site characterization. Once these data needs are identified, collection of the necessary data to allow evaluation of the alternatives under consideration should be undertaken.

**b.** As part of the collection of additional information to support treatability studies for each remedial alternative, a more ***exhaustive literature search*** should be undertaken than was performed during the development and screening process. The objectives of this literature search follow:

- **To determine the performance of each alternative under similar site condtions, or on similar contaminants and effected media;**
- **To gather informationon the operating parameters of each remedial alternative treatment efficiencies: and the cost of design. construction. operation, and maintenance; and**
- **To confirm that treatability studies are required.**

**c.** The process of conducting studies of ***treatability elements*** involves:

- **Determining the scale of the study (e.g., bench or pilot scale:**
- **Preparing a work plan, QAPP, and FSP for the bench-or pilot-scale study;**
- **Performing the bench- or pilot-scale studies;**
- **Evaluating the results of the studies; and**
- **Preparing a brief report on the results of the treatabiliity studies.**




## XVI. The RCRA Corrective Measures Study

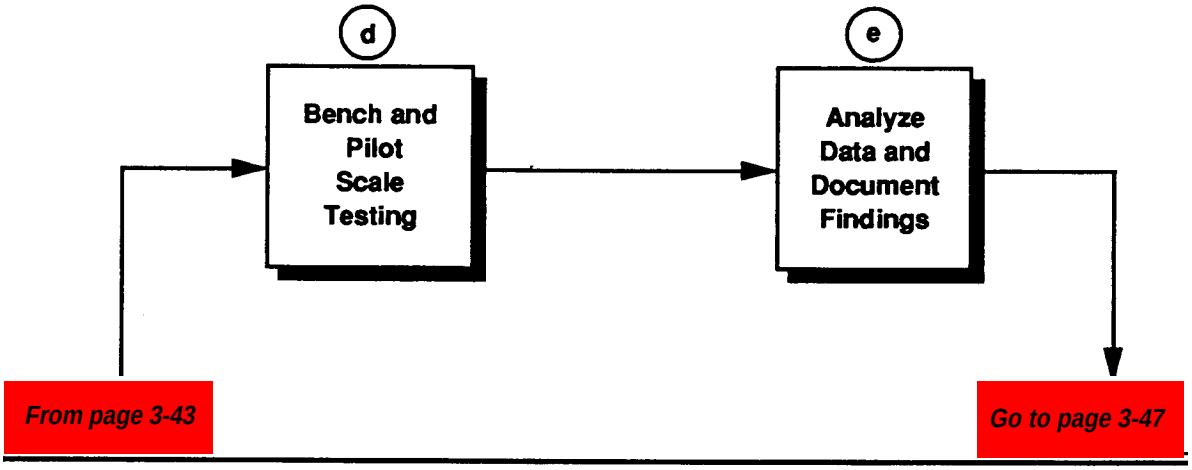
1. **Conducting the CMS.** As described in the DOE *RCRA Corrective Action Program Guide,* conducting a CMS is a two-step process involving (1) evaluating the effectiveness of each alternative for the corrective action, and (2) analyzing and evaluating the testing results according to the evaluation criteria developed during the scoping process and described in the CMS plan. While this process is usually conducted during the CMS, under the proposed Subpart S rule EPA has the authority to require testing to occur concurrently with the RFI in order to prevent a delay in conducting the corrective measure. Generally, such concurrent testing would occur in the form of treatability studies.

2. **Treatability Testing.** The first phase of conducting the CMS is similar to a treatability study conducted under CERCLA and involves ***testing each alternative for the corrective measure.*** Testing of the alternative corrective measures can be either bench or pilot scale, depending upon the nature of the technology under evaluation and the level of detail required for the evaluation. With a proven technology, used under conditions similar to those of the site under study, the testing requirements may be minimal, especially if adequate data on the effectiveness of the technology are available for review. Treatability testing can also be conducted as part of the RFI. However, testing during the RFI should be very limited, as the CMS process may show the technology inappropriate to the conditions at the facility.

a. ***Bench-scale treatabitity testing*** is usually performed in a laboratory. Such testing involves conducting a series of treatability tests with different parameters on small quantities of contaminated material. Analysis of the results of these small-scale tests permits evaluation and optimization of the operational parameters of the alternative quickly and at a relatively low cost.

b. ***Pilot-scale treatabifity testing*** involves building a scaled-down version of a treatment technology and simulates the physical and chemical parameters of that particular remedial technology. Pilot-scale testing should simulate full-scale operations and usually permits only limited variance of operational parameters. The results of a pilot-scale test allow assessment of the overall effectiveness and practicality of a remedial technology.

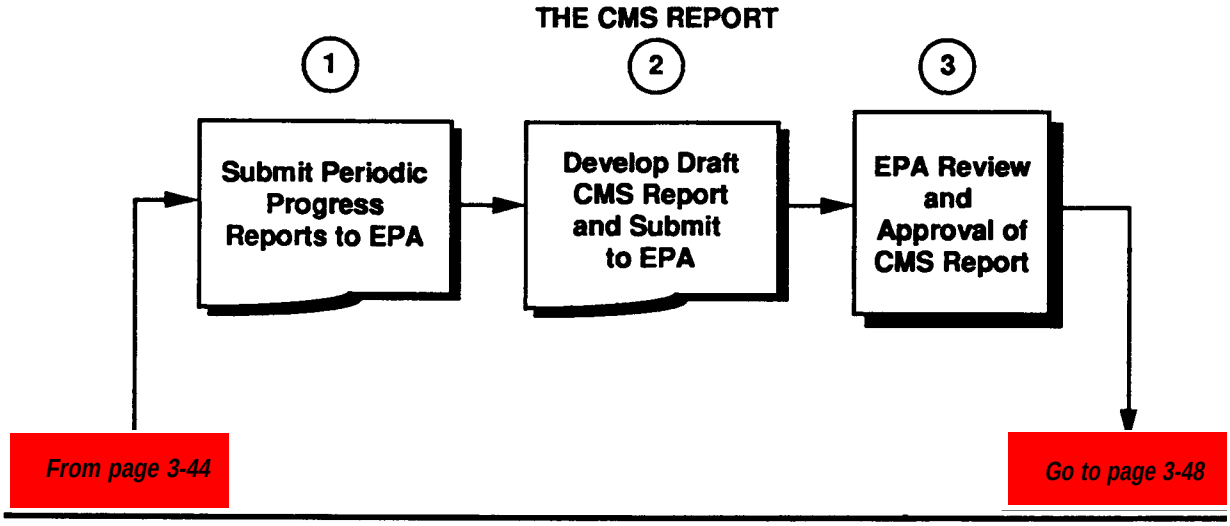
3. **Evaluation of Alternatives.** Once the testing of the alternatives for the corrective measure is complete, each alternative is subjected to the evaluation criteria developed during the scoping process.




**d.** ***Bench-scale treatability testing*** is usually performed in a laboratory. Such testing involves conducting a series of treatability tests with different parameters "on small quantities of contaminated material taken from the site. Analysis of the results of these small-scale tests permits evaluation of the alternative quickly and at a relatively low cost.

***Pilot-scale treatabifity testing*** involves building a scaled-down version of a treatment technology that simulates the physical and chemical parameters of that particular remedial technology. Pilot-scale testing should simulate full-scale operations and usually permits only limited variance of operational parameters. The results of a pilot-scale test allow assessment of the overall effectiveness and practicality of a remedial technology.

e. Once the treatability studies are complete, DOE should carefully ***analyze the data*** collected to determine the effectiveness, implementability, and cost of each alternative tested. DOE should develop a ***document summarizing the results*** of the treatability testing. This document will be used in the detailed evaluation of the alternatives and will also be used during the selection of the remedy.




## XVII. The RCRA Corrective Measures Study Report

1. **Submit Periodic Progress Reports.** Under proposed 40 CFR §264.524, EPA may require that periodic progress reports be submitted during the CMS. Based upon the information in these reports, EPA may change any part of the CMS.

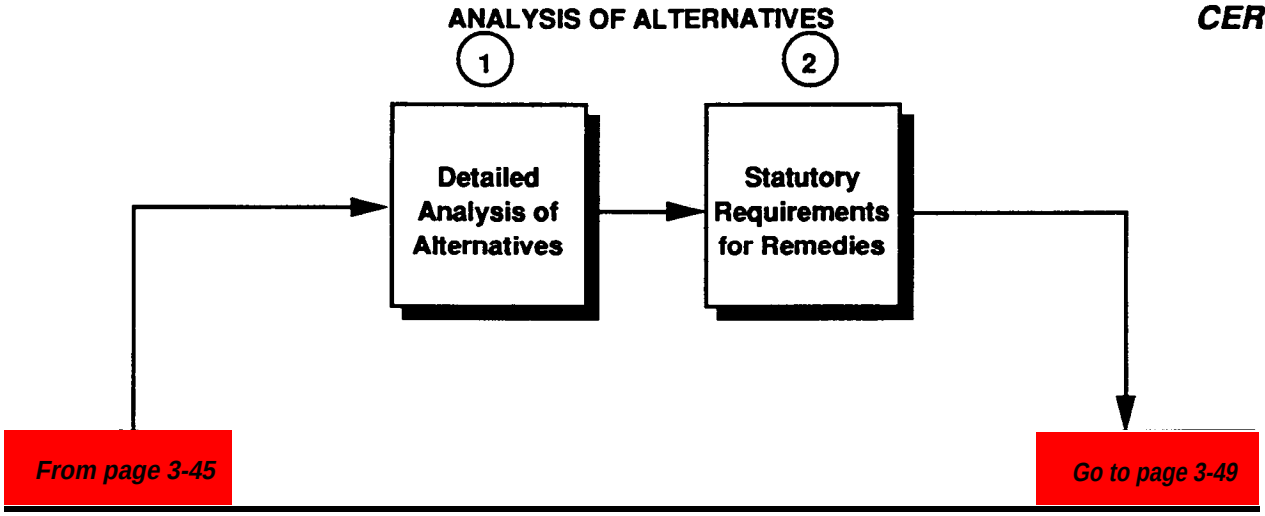
2. **Development and Submission of Draft CMS Report.** Upon completion of the CMS, DOE prepares a draft CMS report and submits the report to EPA for review and approval. The CMS report must discuss how each alternative for the corrective measure satisfies the standards and selection factors. The key points to discuss in the CMS report follow:

- **A brief discussion of the history and current facility conditions, including a summary of risks posed by the facility;**
- **Identification and a description of each alternative corrective measure;**
- **Evaluation of each alternative including discussion of the following:**

  **- Long-term reliability and effectiveness of each remedy**
  **-Reduction of toxicity. mobility. or volume of contaminants at the facility:**
  **- The short-term effectiveness of each potential remedy;**
  **- Implementability of each potential remedy;**
  **- Cost of each remedy; end**

- **Identification and justification of DOE'S preferred corrective measure.**

3. **EPA Review end Approval of CMS Report.** DOE submits the draft CMS report to EPA for review and approval. After review of the draft CMS report, EPA may require DOE to conduct additional investigations or studies of other alternative corrective measures. The final, EPA-approved CMS report becomes the basis for the remedy selection process. it should also be noted that DOE's preferred corrective measure is not binding upon EPA. The selection of the corrective measure is solely the responsibility of EPA.

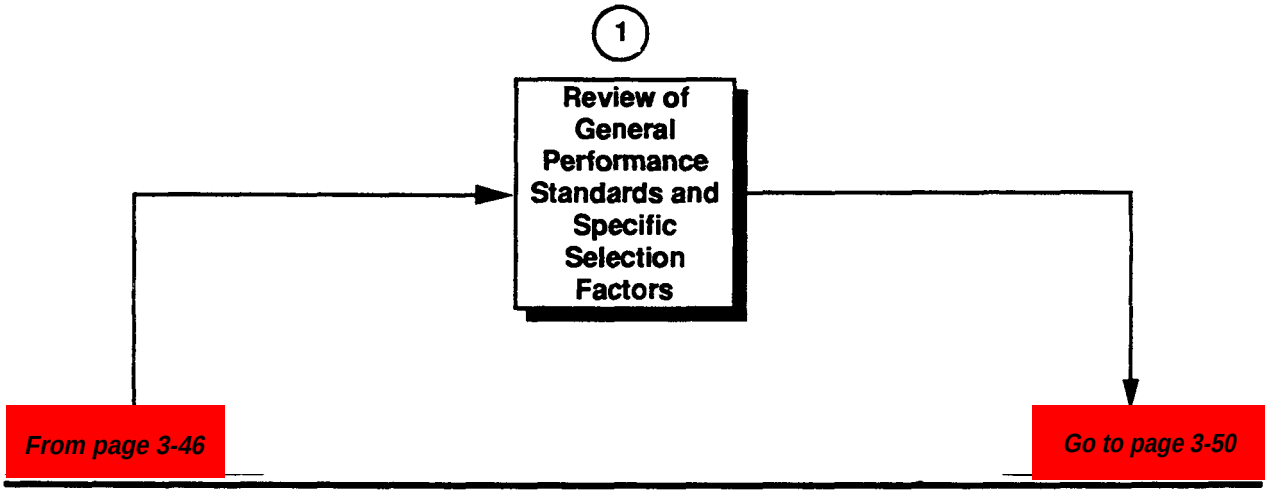



## XVIII. CERCLA Feasibility Study: Detailed Analysis of Alternatives

1. **Detailed Analysis of Alternatives.** The detailed analysis of alternatives consists of examining information needed to make an informed selection in choosing a remedial action. During this stage of the RI/FS, each alternative is assessed against the nine evaluation criteria found in 40 CFR §300.430(e)(9) (iii) (see 3 below); the results-of this analysis are then compared with each of the other alternatives. The nine evaluation criteria are based on the CERCLA Section 121 statutory requirements.

2. **Statutory Requirements of Remedies.** CERCLA Section 121 statutory requirements are as follows:

- **Protect human health and the environment**
- **Attain ARARs or provide reasons for not achieving ARARs;**
- **Be cost effective:**
- **Utilize permanent solutions, alternative solutions, or resource recovery technologies to the maximum extent possible; and**
- **Satisfy the preference for treatment that reduces the toxicity, mobility, or volume of the contaminants as opposed to an alternative that provides only for containment.**



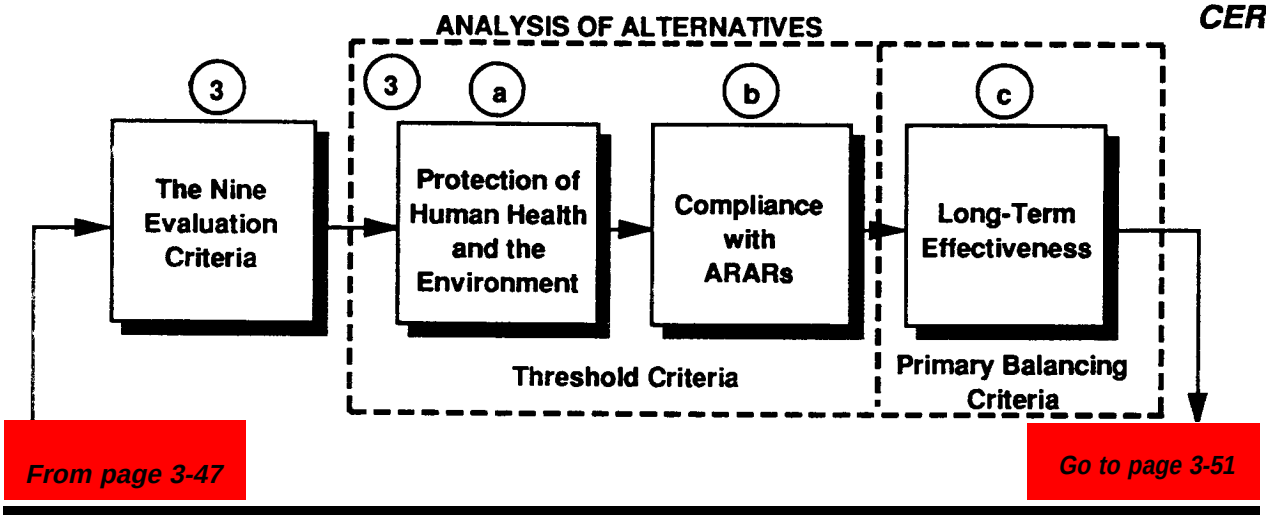

## XIX. Selection of the RCRA Corrective Measure

**1.** General Performance Standards and Specific Selection Criteria for Corrective Measures. The CMS process provides a detailed evaluation of several alternatives for the corrective measure. The bases for this analysis are the general performance standards and specific decision factors for selecting the corrective measure for the SWMU or CAMU. The general performance standards of proposed 40 CFR §264.525(a) state a corrective measure must:

- **Provide protection of human health and the environment**
- **Attain final MCS**
- **Provide source control to reduce or eliminate further releases that may pose a threat to human health and the environment and**
- **Comply with the standards for management of wastes generated during the corrective measure.**

The specific decision factors of proposed 40 CFR §1264.525(b) that are used in selecting the final corrective measure include the following:

- **Long-term reliability and effectiveness;**
- **Reduction of toxicity, mobility, end volume of the hazardous waste or hazardous waste constituents:**
- **Short-term effectiveness, inocluding the risks associated with implementing the corrective measure;**
- **Implementability; and**
- **Cost.**




3. **The Nine Evaluation Criteria.** Based upon the statutory requirements for remedial actions, the NCP establishes nine evaluation criteria used to assess the merit of each remedial alternative. These criteria, found at 40 CFR §300.430(e)(9) (iii) and described in more detail in the EPA RI/FS guidance, reguire each remedial alternative be evaluated on the basis of the following:

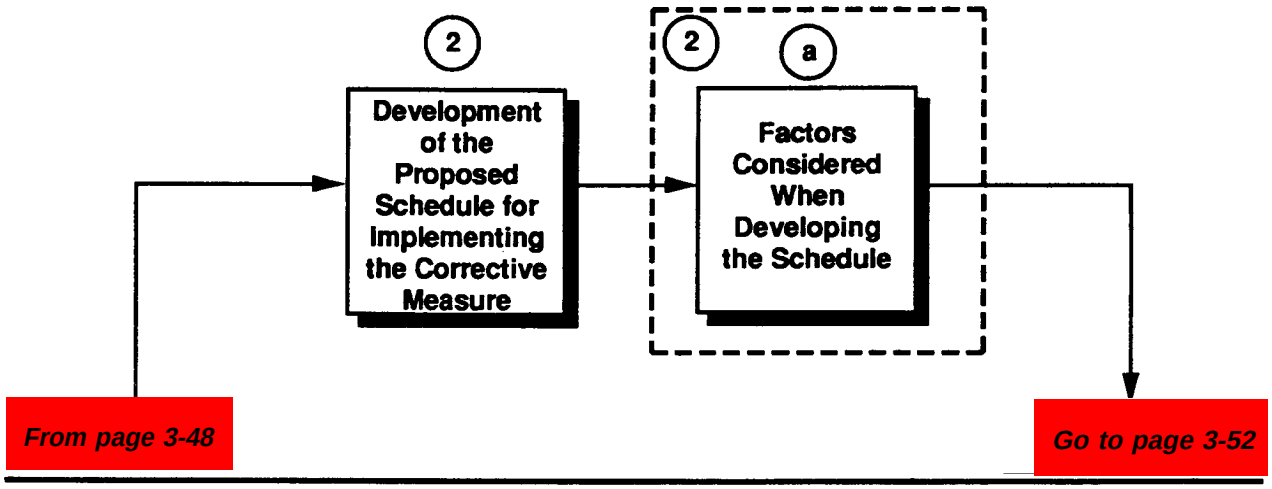
- **Threshold criteria –**
  - **overall protection of human health and the environment,**
  - **Compliance with ARARs,**
- **Primary Balancing Criteria –**
  - **Long-term effectiveness and permanence of the remedy;**
  - **Reduction of the toxicity. mobility, and volume of the contaminants present at the site**
  - **Short-term effectiveness of the remedy (i.e., protectiveness during implementation);**
  - **implementability of the remedy;**
  - **Cost of the remedy:**
- **Modifyinng criteria –**
  - **State acceptance of the selected alternative, and**
  - **Community acceptance of the selected alternative.**

**a.** Under the first evaluation criteria, the ability of each alternative to provide ***protection of human health and the environment*** *is* assessed. This criterion draws on the baseline risk assessments (i.e., human health and ecological) and the evaluations of other criteria, especially the long- and short-term effectiveness evaluations.

**b.** ***Compliance with ARARs*** requires evaluation of the ability of each alternative to comply with chemical-specific, action-specific, and location-specific ARARs, as well as other criteria, advisories, and guidelines. If an alternative cannot achieve compliance, justification for a waiver of the ARAR must be developed.

**c.** The ***long-term effectiveness*** evaluation assesses the residual risk posed by the site following the remedial action. This assessment also considers the reliability and adequacy of the remedial action in providing a ***long-term solution*** to the contamination at the site.

SELECTION OF THE CORRECTIVE MEASURE



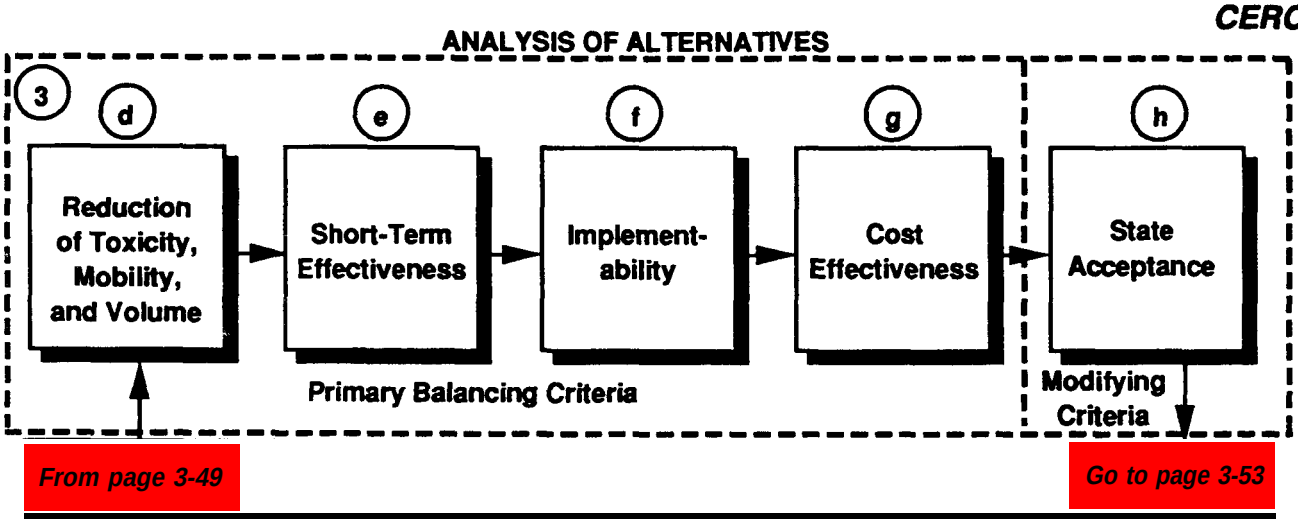

**2. Schedule for Implementing the Corrective Measure.** Under Section §264.525(c) of the proposed Subpart S rule, EPA specifies the schedule for implementing the corrective measure. The schedule is determined as part of the corrective measures selection process. DOE has the opportunity to influence schedule development through the conclusions of the RFI and CMS reports, through negotiation and discussion with EPA, through use of the public comment period.

**a.** In developing the schedule, EPA considers several factors. These include:

- **The extent end nature of the contamination;**

  **The capabilities of the alternatives for the corrective measure to achieve MCS and other objectives (e.g., source control, compliance with applicable waste management requirements] of the RCRA Corrective Action program:**

- **The availability of treatment or disposal capacity for wastes resulting from implementation of the corrective measure;**
- **The desirability of using an emerging technology:**
- **The risk posed to the surrounding area arising from exposure before implementation and completion of the corrective measure; and**
- **Other factors that EPA may considae pertinent.**



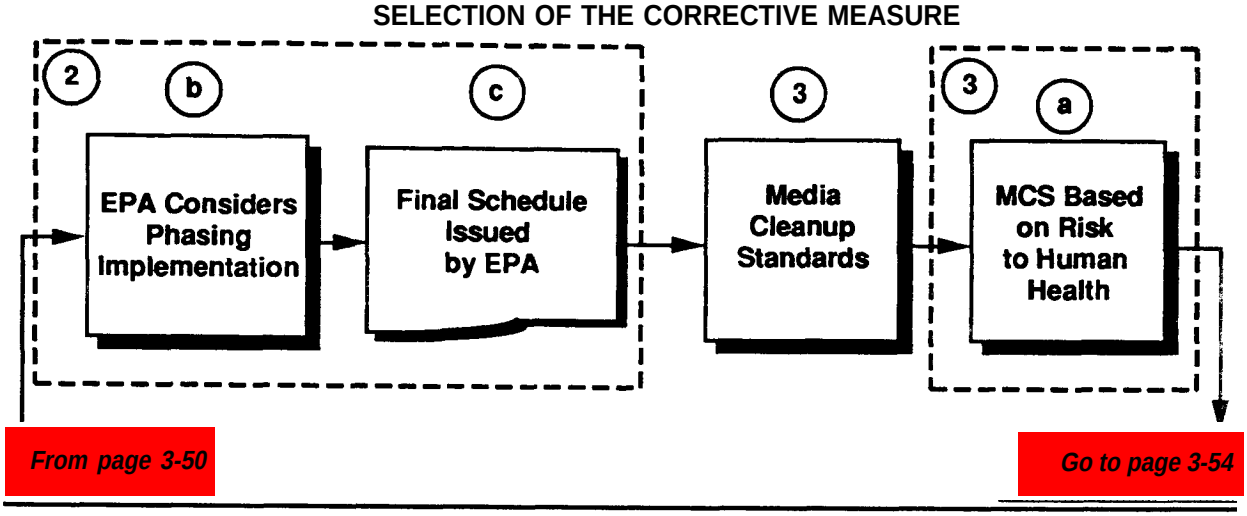

**d.** ***Evaluation of how the remedy acts to reduce the toxicity, mobility, and volume of the contamination.*** This involves assessment of the treatment process, the materials being treated, the effectiveness of the treatment, and the quantity of contaminated material remaining following the remedial action.

**e.** The ***short-term effectiveness*** criterion addresses the risks posed by each remedial alternative during construction and implementation, up to the time the remedial action objectives are achieved. Under this criterion, each alternative should be evaluated to determine the degree of protection afforded the surrounding community during the remedial action, the degree of risk posed to workers during implementation, the adverse environmental impacts arising from construction and implementation, and the time required to achieve the remedial action objectives.

**f.** The ***implementability*** criterion assesses both the technical and administrative feasibility of implementing each remedial alternative. Included in this assessment are (1) consideration of the availability of the necessary resources to construct and implement the remedy, (2) an assessment of the reliability of the technology, and (3) the ease of undertaking other remedial actions at the site once the alternative is implemented. Another aspect of this assessment is the determination of the requirements for interaction with other Federal, State, or local agencies. For example, this assessment may require determining any necessary permits for off site activities.

**9.** CERCLA requires that any remedy selected be ***cost effective.*** The evaluation of this criterion requires assessment of direct and indirect capital costs, as well as the operating and maintenance costs, associated with the remedial action. Operation and maintenance costs are usually a significant portion of the overall costs of a remedial action. This process should also consider the costs of any long-term liability associated with implementing the remedy.

**h.** Assessment of ***State acceptance*** of the selected remedial alternative is difficult at this point in the RI/FS; however, the Streamlined Approach for Environmental Protection (SAFER) recommends that all “stakeholders” (e.g., the State and community) be brought into the scoping and selection process as soon as is practicable, preferably at the start of the RI/FS. Usually this occurs following issuance of the draft ROD for the site. However, through discussions and negotiation with EPA and the State, DOE can begin to assess the degree of State support of the proposed remedial alternatives.



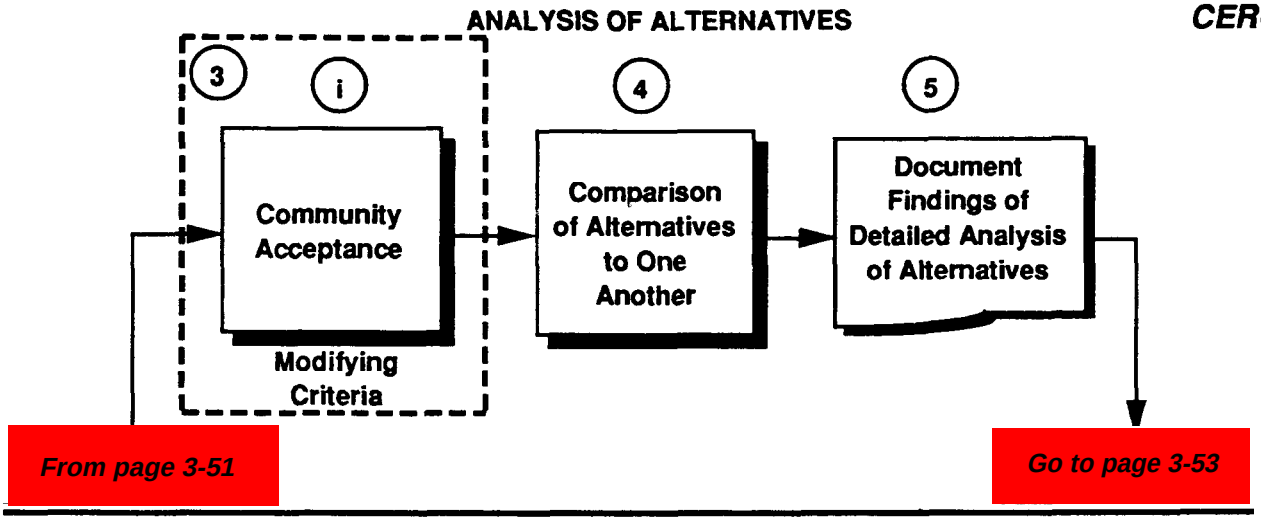

**b.** In developing the schedule, EPA also evaluates the potential benefits of a phased implementation of the corrective measure. A phased corrective measure consists of any logically connected series of actions performed sequentially at the same SWMU or simultaneously or sequentially at different SWMUs within the facility. A phased corrective measure is most likely to be selected when a single action is incapable of remediating all the SWMUs within a facility.

**c.** The final schedule issued by EPA becomes an enforceable part of the permit for the facility. If problems arise with maintaining compliance with the schedule, the proposed rule requires DOE to seek a schedule modification (a minor permit modification) before becoming non-compliant. During development of the schedule, DOE should request inclusion of provisions allowing flexibility in the schedule. Adequate flexibility should minimize the number of modifications to the schedule.

**3. Media Cleanup Standards.** MCS, described in detailed in the preamble to the proposed Subpart S rule (55 FR 30825), are media-specific concentrations of hazardous waste constituents which are determined by EPA to be protective of human health and the environment. Reduction of the concentration of hazardous waste constituents at the point of compliance to the MCS is the primary objective of the implemented corrective measure.

The final MCS are different from action levels and target MCS. Action levels are media-specific contaminant concentrations determined by EPA to be protective of human health and the environment, but are not cleanup goals. Rather, action levels serve as the triggering mechanism for a CMS. If, during the RFI, sampling determines that hazardous waste concentrations exceed action levels, a CMS is usually required at that SWMU. Target MCS are preliminary cleanup goals established during the CMS to provide a benchmark for evaluating the effectiveness of the alternatives for the corrective measure. Target MCS and action levels can differ significantly from the final MCS established for the corrective measure.

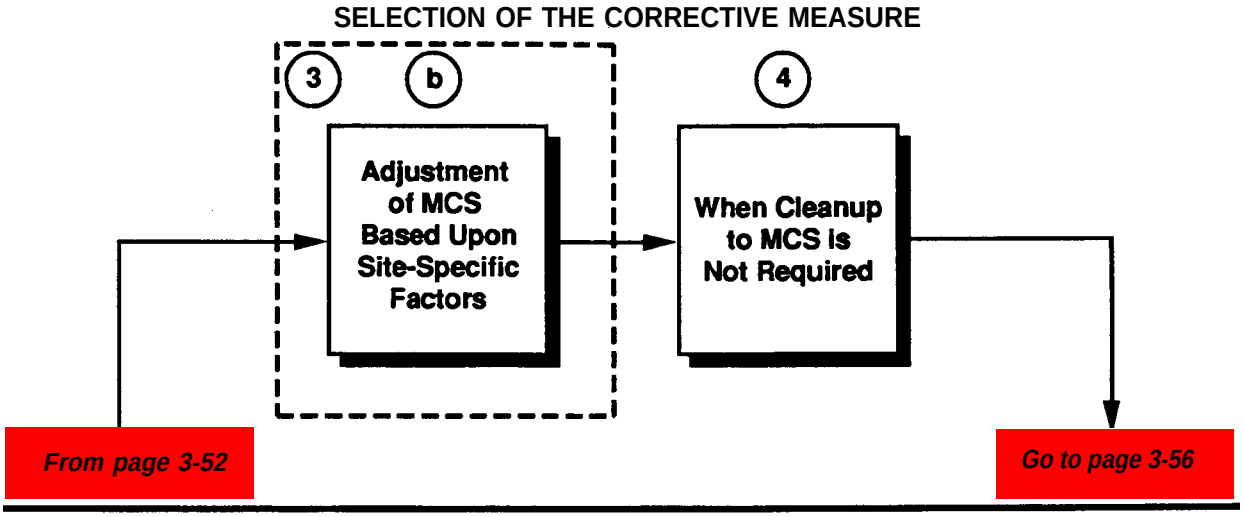
**a.** Developing the MCS is a two-step process. The first step establishes the MCS based upon the risk to human health. This protectiveness standard sets the range for an acceptable risk from exposure to carcinogenic compounds at an excess lifetime cancer risk of 1 additional case of cancer in 10,000 persons to 1 additional incidence of cancer in 1,000,000 persons (i.e., $10^{-4}$ to $10^{-6}$ excess lifetime cancer risk). The standard for systemic toxicants is that concentration to which human populations (including sensitive subgroups) can be exposed on a daily basis without appreciable risk of deleterious effects during a lifetime of exposure.




i. The final evaluation criterion, ***community acceptance,*** is also assessed following release of the draft ROD. However, much in the same way that it is possible to determine State acceptance of the proposed remedial alternatives, the community relations program should be seeking input from the public on community acceptance of the remedial alternatives that have been evaluated during the FS.

4. **Comparison of Alternatives.** Once each alternative has been subjected to the evaluation process, the remedial alternatives are compared to one another using the same nine evaluation criteria to determine the trade-offs among them (see Section XXI, *CERCLA Remedy Selection, Identifying a Preferred Alternative,* page *3-57).* For example, two alternatives may provide equal protection but have widely differing costs, On this basis, the less costly, equally protective alternative would be preferred over the more costly alternative.

5. **Document Findings of Detailed Analysis.** DOE should document the findings of the detailed analysis of remedial alternatives. This document should include a discussion of each alternative and the combination of alternatives evaluated. This document will become the basis for the FS report (discussed in the next section).



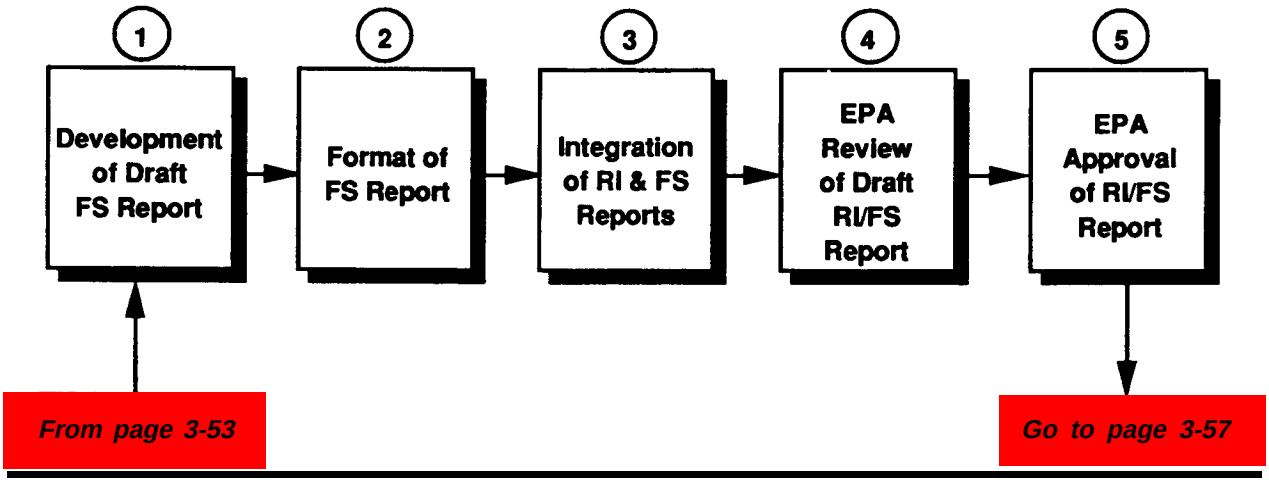

**b.** The second step in setting the MCS involves adjusting the MCS to be more or less stringent based on other factors including the following:

- **The effects of exposure to multiple contaminants;**
- **The impact to environmental receptors;**
- **The cumulative risk arising from other exposures not directly related to the release; end**
- **The effectiveness, practicality, raliability, and other factors related to the alternatives for the corrective measure end the ability of the corrective measure to achieve the MCS.**

**4.** **When Cleanup to MCS Is Not Required.** Pursuant to proposed 40 CFR §264.525(d)(2), under certain conditions DOE may not be required to clean up a release to MCS levels. These conditions include the following:

- **If, in broadly contaminated areas, the risk posed by a release from a single SWMU is trivial compared to the risk posed by the entire area;**
- **Implementation of a corrective measure will not significantly reduce any risk to human health and the environment**
- **If en aquifer can be shown not to be a potential or actual source of drinking water and the contamination present does not exceed action levels; or**
- **If the cleanup of a release is technically impractical due to engineering feasibility and reliability considerations.**

DOE is responsible for developing the evidence to support any request to waive the cleanup requirements. DOE should carefully assess the cost of, and potential for, successfully supporting such an assertion. EPA retains the authority to require source controls or other measures to limit further releases or release migration from the SWMU.




## XX. Development of the CERCLA FS Report

1. **Development of Draft FS Report.** Once the detailed analysis of the remedial alternatives is complete, a draft FS report should be developed. This report, along with the RI report discussed previously, will become the basis for the selection of the remedy.

2. **Format of FS Report.** There is no specific format for an FS report; however. according to the EPA guidance on conducting an RI/FS, the elements of an FS report include the following:

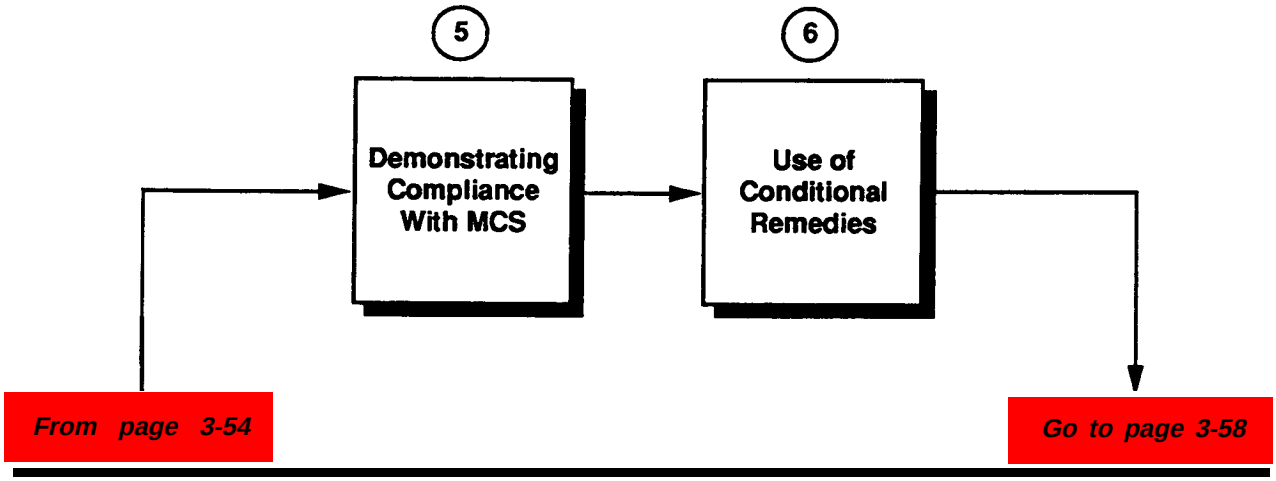
- **Introduction-discussion of the site background, the nature and extent of contamination, and findings of the baseline risk assessment;**
- **Identification and screening of technologies - discussion of the remedial action objectives, the general categories of response actions considered, and identification end screening of specific technologies and process options;**
- **Development and screening of alternatives - the development of the alternatives, the screening process conducted, and the alternatives eliminated from further consideration;**
- **The detailed analysis of alternatives - analysis of individual alternatives and the comparison of alternatives; end**
- **Appendices-supporting information.**

3. **Integration of RI and FS Reports.** The RI report, the results of treatability investigations, and the FS report are then integrated to make a draft RI/FS report. DOE will develop this document and submit it to EPA for review and approval.

4. **EPA Review of Draft RI/FS Report.** Upon review of the draft RI/FS report, EPA may require that additional studies or investigations be conducted.

5. **EPA Approval of RI/FS Report.** If EPA approves the draft RI/FS report, the next phase of the CERCLA response process is to select the remedial action and develop the ROD.

SELECTION OF THE CORRECTIVE MEASURE

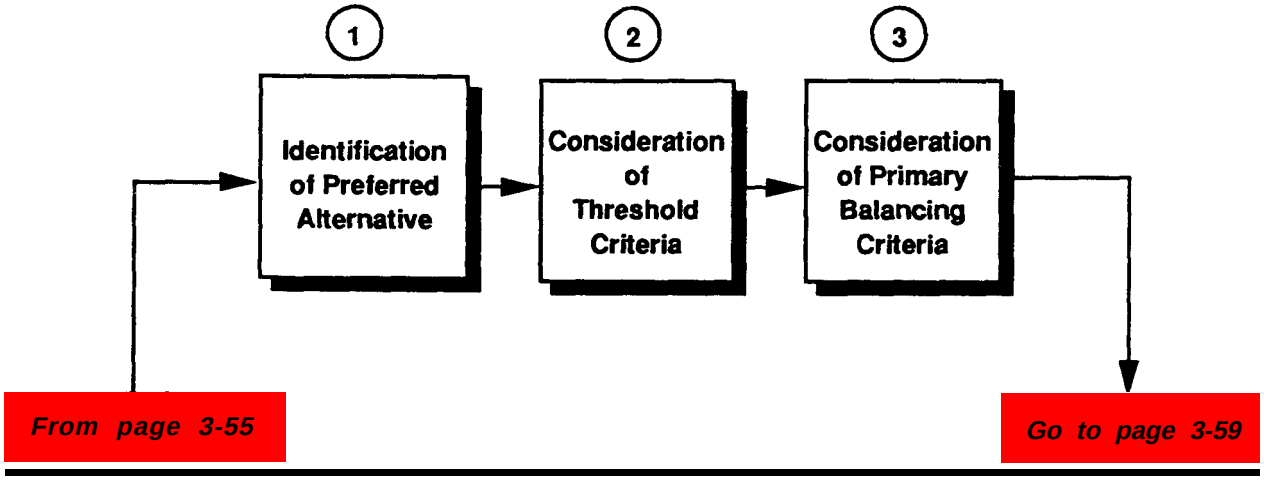



5. **Demonstration of Compliance with MCS.** EPA specifies the requirements for demonstrating compliance with MCS in the facility permit. These requirements include:

- Establishing the points where DOE demonstrates compliance for each environmental media (known as the point of compliance [POC]);
- The acceptable sampling. analytical, and statistical methods; and
- The period over which the facility will demonstrate compliance.

Ending the requirement for conducting a RCRA Corrective Action at the facility hinges upon the demonstration of compliance with the MCS established in the facility permit. Therefore, developing the requirements for demonstration of compliance requires close scrutiny by the facility and, if necessary, negotiation.

6. **Conditional Remedies.** In the preamble to the proposed Subpart S rule (55 FR 30833), EPA states that conditional remedies are expected to be common at Federal facilities due to the large number of SWMUs at most Federal facilities, technical limitations such as the availability of treatment technology, and the unique constraints of the Federal budget process. Adoption of a conditional remedy allows DOE to phase in a corrective measure over a specified period, providing certain conditions are met during implementation.

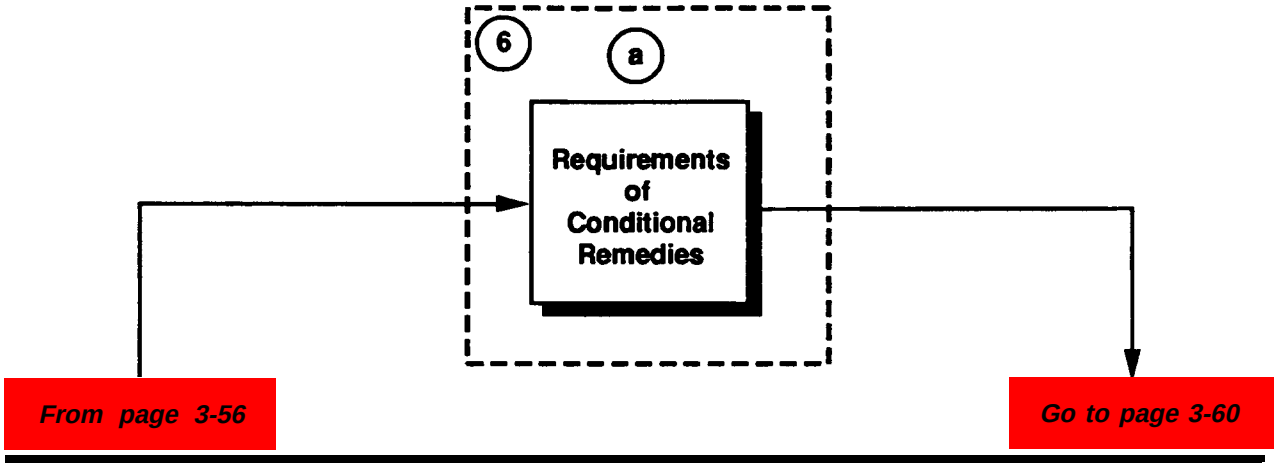



## XXI. CERCLA Remedy Selection, Identifying a Preferred Alternative

1. **Identification of Preferred Alternative.** Following the detailed analysis and feasibility studv of remediation alternatives, DOE identifies a preferred alternative for the remedial action that best meets the five statutory requirements discussed previously (Section XVIII):

2. **Consideration of Threshold Criteria.** In identifying a preferred alternative, DOE must weigh each alternative against the nine criteria. Among these criteria, *overall protection of human health and the environment and compliance with ARARs are considered "threshold criteria."* Each alternative must meet these criteria in order to be eligible for consideration as the preferred alternative. Any alternative that does not meet the threshold criteria is eliminated from further consideration.

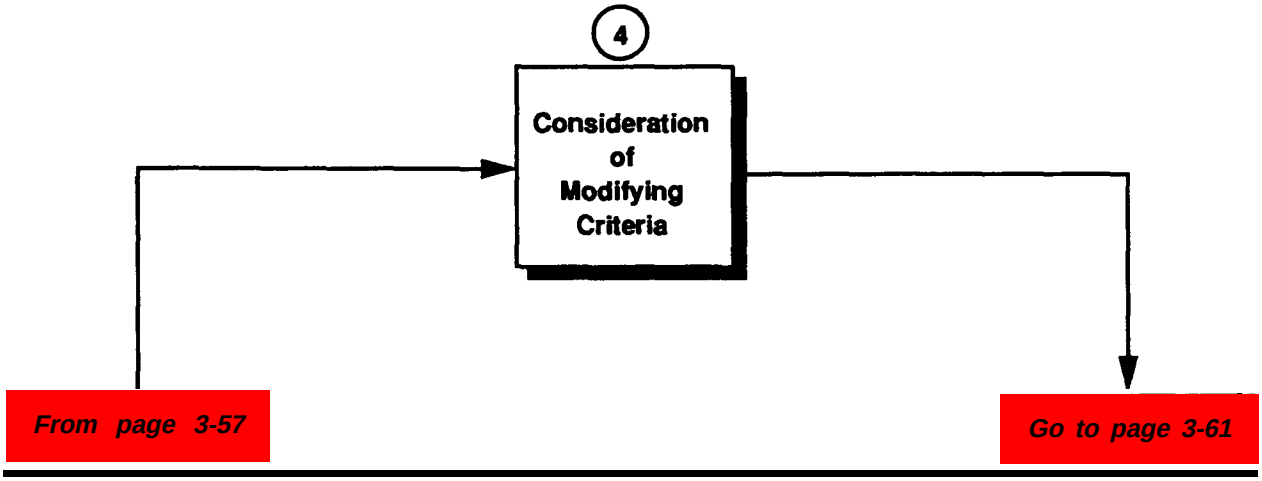
3. **Consideration of Primary Balancing Criteria.** Next, trade-offs among alternatives that pass the threshold criteria test are evaluated and weighed against the five "primary balancing criteria" discussed in Section XVIII, Step 3, p. 3-49.



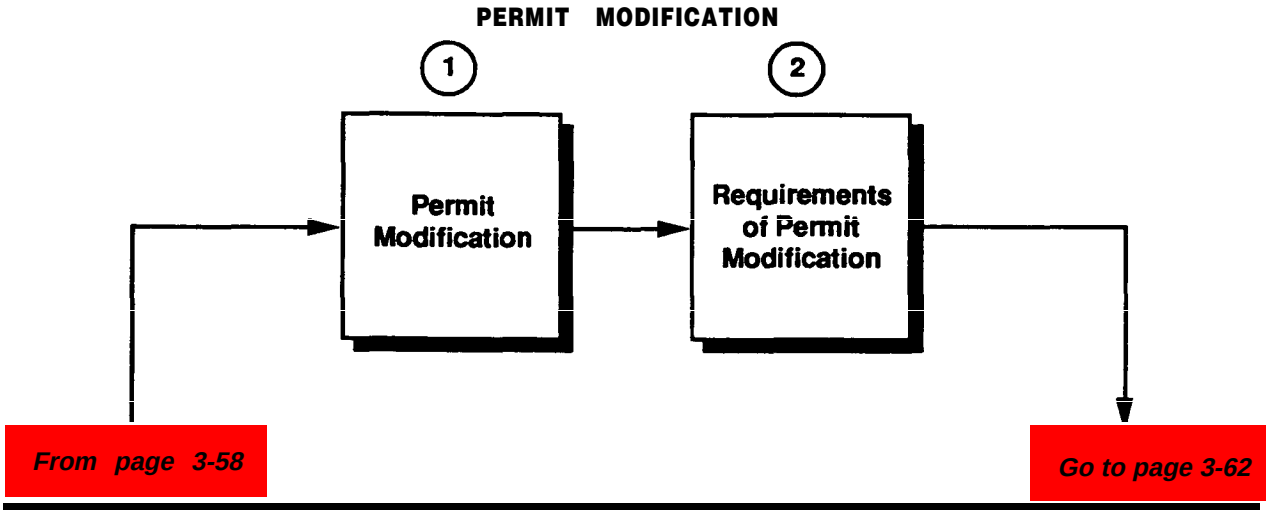

**a.** Under proposed 40 CFR §264.525(f), a conditional remedy *must* do the following:

- **Be protective of human health and the environment**
- **Achieve all MCS beyond the facility boundary as soon as practicable:**
- **Prevent further significant migration of releases within the facility as soon as practicable;**
- **Control the source(s) of release(s) by using treatment or other necessary engineering methods as soon as practicable;**
- **Institute effective institutional or other controls to prevent exposure to hazardous wastes;**
- **Continue monitoring of releases to determine if significant environmental degradation does occur;**
- **Provide financial assurances (not applicable at Federal facilities); and**
- **Comply with the waste management standards for waste generated during corrective actions.**

There is one important feature and one important caveat to conditional **remedies.** The important feature of a conditional remedy is that contaminants can remain at an operating facility if (1) DOE implements source controls that prevent offsite migration; (2) the risk of exposure, additional releases, or further migration is low; and (3) there is remediation of offsite contamination to MCS (as soon as practical). The caveat is that conditional remedies are not necessarily final remedies. Remediation of all contamination at the facility is a potential requirement to release facilities from their obligation to conduct RCRA Corrective Action.




***4.*** **Consideration of Modifying Criteria.** State and community acceptance are "modifying criteria" that are also considered. If the degree of State and community acceptance is unknown, the criteria are considered later in the remedy selection process.

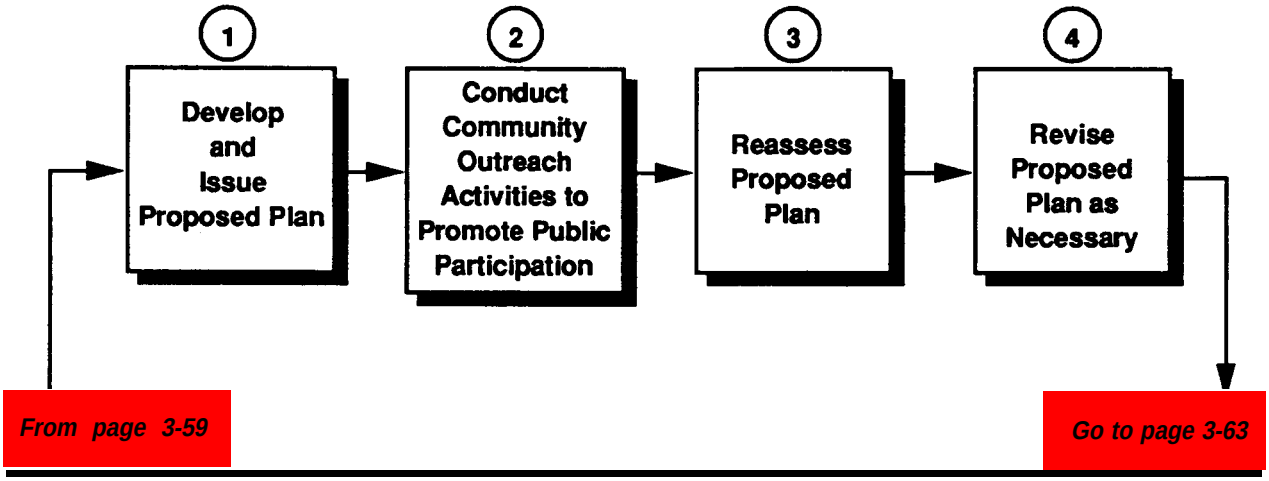



## XXII. RCRA Permit Modification

1. **Permit Modification.** A modification to an existing facility permit (or RCRA 93008[h] Order) requiring implementation of the corrective measure is the final step in the selection of the corrective measure.

2. **Requirements for the Permit Modification.** If a permit modification is required, it follows the process for a "major" permit modification as described in 40 CFR 5270.41. This process requires development of a draft permit or permit modification meeting specific requirements, and a public review and comment period. The draft permit or permit modification and Statement of Basis are the documents that are made available to assist the public in understanding the RCRA Corrective Action activities atthefacility. The specific elements required in the draft permit or permit modification are as follows:

- **A description of the technical features of the corrective measure necessary for ac!deving the standards for the corrective measure;**
- **A listing of all MCS, by environmental media, established for the corrective measure;**
- **The requirements for demonstration of compliance;**
- **Specific requirements for the management of waste generated during implementation of the corrective measure;**
- **The procedural for decontamination, removal, or closure of any units or structures used during implementation of the corrective measure;**
- **A detailed schedule for implementing all the major technical features of the corrective measure; and**
- **Any requirements for submission of periodic progress reports.**




## XXIII. CERCLA Remedy Selection and the Proposed Plan

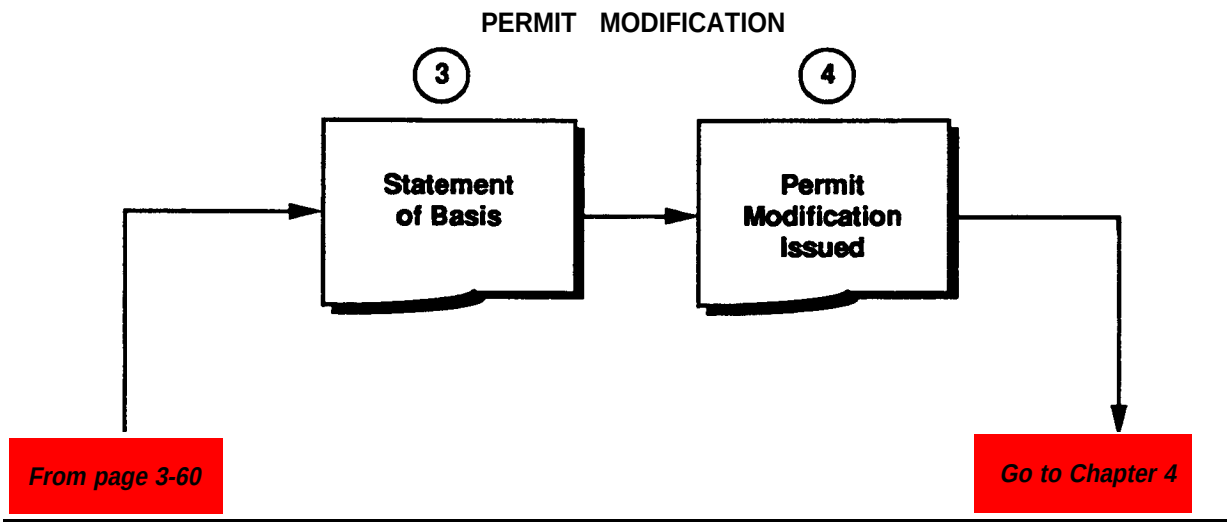
1. **Develop and Issue Proposed Plan.** The preferred alternative identified by DOE is presented to the public in the Proposed Plan. A Proposed Plan is required under 40 CFR §330.430(f)(2) and is described in detail in the EPA document titled *Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment.* The Proposed Plan, a document intended for a general audience, describes the remedial alternatives analyzed, identifies the preferred alternative, and discusses the rationale for its selection. It supplements the R1/FS report and is released for public comment along with the R1/FS report, providing the public an opportunity to examine and comment on remediation alternatives (including the preferred alternative) and participate in the remedy selection process as required under 40 CFR §300.430(f)(3).

2. **Conduct Community Outreach.** DOE should conduct a variety of community outreach efforts to achieve the CERCLA §121 requirements for promotion of public participation in the remedy selection process and to comply with the requirements of 40 CFR §300.430(f)(3). These outreach efforts include the following:

   - **Publishing a notice of the availability of the Proposed Plan,**
   - **Making the Proposed Plan and the supporting analyses available to the public,**
   - **Holding a public hearing near the site to discuss the preferred alternative, and**
   - **Providing a minimum 30-day period for public comment on the Proposed Plan.**

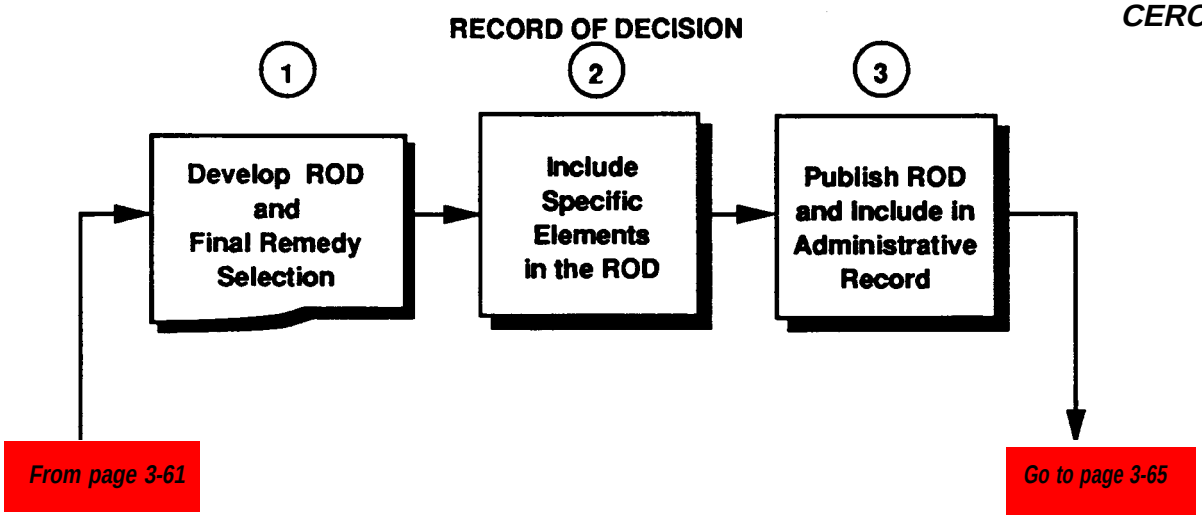
3. **Reassess Proposed Plan.** Following public comment, DOE must reassess the preferred alternative in light of any new information developed during, or obtained as a result of, the public comment process. The purpose of this review is to determine whether the preferred alternative remains the most appropriate. The “modifying criteria” of State and community acceptance may enter the evaluation at this point. The preferred alternative may then be adopted or modified, or a different alternative may be identified as the preferred alternative.

4. **Revise Proposed Plan as Necessary.** If there are significant changes to the scope, performance, or cost of the preferred alternative as a result of this process, it may be necessary to issue a revised Proposed Plan and solicit further public comment. This is necessary only if the changes are so dramatic that they could not have reasonably been anticipated based on information available during the public comment period. Selection of a new preferred alternative not previously evaluated is one example; however, selection of a new preferred alternative already evaluated in the Proposed Plan would not trigger the need for further comment.




3. **Develop Statement of Basis.** The Statement of Basis (analogous to a ROD under CERCLA) provides general information about the corrective measures selected by EPA, and also provides an explanation of the process and selection criteria. For additional information on the Statement of Basis, consult the EPA document *RCRA Corrective Action Decisions Documents Guidance (1990).*

4. **Permit Modification Issued.** The selected corrective measure and a schedule for implementing the corrective measure required under the permit modification become enforceable parts of the facility permit. Chapter 4 of this document discusses the actual design and implementation of the corrective measure.




## XXIV. CERCLA Remedy Selection and the Record of Decision

1. **Develop ROD end Finel Remedy Selection.** When the final remedy is selected, 40 CFR §300.430(f) requires that the decision be documented in the ROD. The ROD is a formal, legal mechanism for documenting the remedy selection process and the analyses and policy determinations that support selection of the final remedy. Under 40 CFR §300.430(f)(5), the ROD must describe the following:

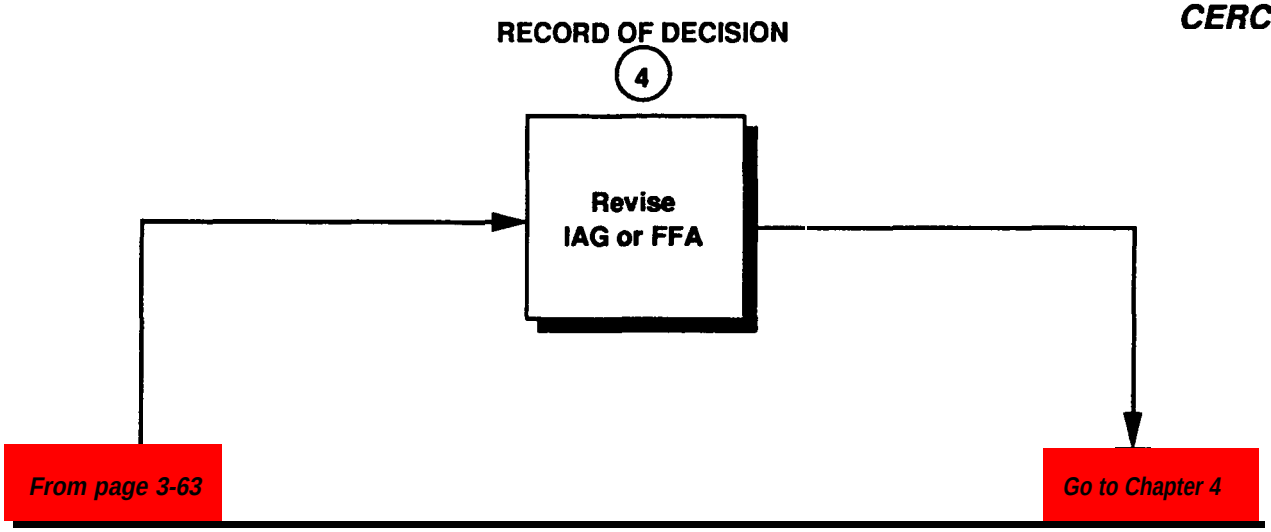
- **How the remedy is protective of human health and the environment, and how it eliminates, reduces, or controls exposure to hazardous substances, pollutants, and contamiants:**
- **The Federal and State ARARs the remedy will attain, those that will not be met and the justification for waivers;**
- **How the remedy is cost effective; and**
- **How the remedy uses permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.**

For DOE facilities, remedy selection is a joint responsibility of DOE and EPA. If agreement on the remedy cannot be reached, and the dispute resolution process fails, under 40 CFR §300.435(f)(4) EPA has the authority to unilaterally select the remedy.

2. **Include Specfic Elements of the ROD.** The ROD must also include a written summary of significant comments received through the public participation process, along with responses. Significant changes to the remedy, as compared to the preferred alternative presented in the Proposed Plan, must also be discussed. The ROD should discuss the goals the remedy is expected to achieve and describe whether hazardous substances, pollutants, or contaminants will remain onsite above levels that permit unlimited use and unrestricted exposure. If so, mechanisms must be emplaced to review the remedy not less than every 5 years after initiation.

3. **Publish ROD and Include in Administrative Record.** DOE must publish notice of availability of the ROD, include it in the administrative record for the site, and make it available for public inspection.

This page intentionally left blank.




***4.*** **Revise IAG or FFA.** CERCLA §120 imposes certain schedule demands on Federal agencies. Among these is a requirement for the lead agency to enter into an Inter-Agency Agreement (IAG) or Federal Facility Agreement (FFA) with EPA within 180 days of EPA's acceptance of the RI/FS. The IAG or FFA identifies the selected remedy, provides a schedule for completion, and describes arrangements for long-term operation and maintenance. Completion of the ROD must conform with this schedule. CERCLA §120 also requires that "substantial continuous physical on-site remedial action" begin within 15 months after RI/FS completion. Current DOE practice is to include these provisions in the IAG or FFA developed before the RI/FS is conducted and to amend the IAG or FFA to reflect these requirements once the RI/FS and remedy selection process is complete.

## Summary

| Topic | RCRA |
|---|---|
| **Purpose of the RFI and the CMS** | The RFI is a detailed assessment of the extent, nature, and risk posed by a release of hazardous wastes from SWMUs at a permitted or interim status TSDF. The CMS is the process for the development, testing, and analysis of alternatives for the cleanup of the release. The RFI/CMS process leads to an informed risk management decision regarding the cleanup of contamination at the facility. |
| **Simultaneity of Investigations** | The RF I is not conducted concurrently with the CMS. A CMS is usually required only when contaminants are found in excess of action levels determined to be protective of human health and the environment. |
| **Scoping and Planning the RFI** | The steps in scoping an RFI include the following:<br>• Reviewing existing information about the facility,<br>• Establishing CAMUs,<br>• Setting the RFI objectives and preparing planning documents,<br>• Scoping an interim *CMS* (if required), and<br>• Developing the RFI plan. |
| **Conducting the RFI** | Conducting an RFI is primarily a matter of implementing the RFI plan. This process usually involves sampling and other data collection efforts. |
| **The RFI Report** | A specific format may be required by EPA. The report must document all findings and should support a decision either that no further action is required or that a CMS must be conducted. |
| **Requirement for a CMS** | A CMS is required when the RFI determines that contamination resulting from a release from an SWMU is present in environmental media and is in excess of action levels, and that the release poses a real or potential threat to human health or the environment. |
| **Scoping a CMS** | Scoping the CMS involves the following:<br>• Reviewing information about contamination at the facility,<br>• Phasing the CMS and/or establishing CAMUs,<br>• Streamlining the CMS to focus the evaluation process,<br>• Developing the objectives of the CMS,<br>• Establishing the evaluation process and criteria,<br>• Selecting and screening candidate corrective measures, and<br>• Developing a CMS plan and supporting documents. |
| **Conducting the CMS** | Conducting a CMS involves implementation of the CMS plan, conducting treatability investigations, and assessing the effectiveness of each candidate corrective measure. |
| **The CMS Report** | EPA may require that the CMS report follow a specific format. The CMS report must discuss the findings of the evaluation of each candidate corrective measure. |
| **Selection of the Corrective Measure and Permit Modification** | The selection of the corrective measure is based on the ability of each measure evaluated to (1) provide protection of human health and the environment, (2) attain final MCS, (3) provide source control; and (4) comply with waste management requirements.<br>Based upon the findings of the CMS, EPA will select the corrective measure for the facility. The facility permit will go through a Class III permit modification, or a RCRA §3008(h) Order will be issued, to require implementation of the selected corrective measure. |

**Summary**

| Topic | CERCLA |
|---|---|
| **Purpose of the RI/FS** | The RI/FS is the methodology used to characterize the extent, nature, risk, and alternatives for cleanup of releases of hazardous substances. The RI/FS process leads to an informed risk management decision regarding the cleanup of contamination at the site. |
| **Simultaneity of Investigations** | A CERCLA RI is conducted concurrently and in an iterative fashion with the FS. |
| **Scoping and Planning the RI/FS** | The steps in scoping an RI/FS include the following:<br>• Reviewing existing information about the site to develop a conceptual model and understanding of conditions at the site and to establish operable units,<br>• Establishing the remedial objectives and determining the remedial options available for use at the site,<br>• Identifying ARARs for consideration during the RI/FS, and<br>• Preparing the RI/FS work plan and supporting documents. |
| **Conducting the RI/FS: Site Characterization** | The first step in conducting an RI involves site characterization to determine the source, extent, and nature of the contamination of environmental media. This information is then used to conduct the baseline risk assessment. |
| **The RI Report** | A specific format is not required by EPA. The RI report documents all findings of the site characterization and baseline risk assessment. |
| **Conducting the RI/FS: Development and Screening of Alternatives** | The first phase of the FS, conducted concurrently with site characterization, is development and screening of the remedial alternatives for the site. This process focuses the RI/FS on collection of data to allow evaluation of viable remedial alternatives. |
| **Conducting the RI/FS: Treatability Studies** | Conducting treatability studies is the second phase of the RI. During this phase, the remedial alternatives are subjected to bench- and/or pilot-scale testing to assess their effectiveness under actual conditions. The findings of the treatability studies are summarized in a report which supports the last phase of the FS, the detailed analysis of the remedial alternatives. |
| **Conducting the RI/FS: Detailed Analysis of Remedial Alternatives** | In this, the second phase of the FS, each remedial alternative is evaluated against the nine criteria for remedial actions. This phase uses the findings of both the RI and the treatability studies to determine which alternative provides the greatest benefits while at the same time maximizing the use of available resources (i.e., funding). |
| **The RI/FS Report** | The findings of the detailed analysis of alternatives are summarized in the FS report. The RI report, the treatability studies report, and the FS report are then integrated into the final RI/FS report. This report becomes the basis for the selection of the remedial action for the site. |
| **Remedy Selection and the Record of Decision** | Upon completion of the RI/FS report, DOE will develop a Proposed Plan outlining the preferred alternative and the reasons for the selection of that alternative. This document is released for public review, and a response and comment period is required. Following review of the Proposed Plan and the RI/FS report, DOE, EPA, and the State select the remedial alternative to be implemented, and document the reason for this selection in an ROD. |

## References


The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act (SARA)). 42 USCA §9601 et seq.

The National Oil and Hazardous Substances Pollution Contingency Plan. (40 CFR Part 300).

The Resource Conservation and Recovery Act (RCRA) (as amended by the Hazardous and Solid Waste Amendments [HSWA]. 42 U.S.C. §6901 et seq.

USDOE. *Public Participation in Environmental Restoration Activities (D OE/EH-0221).* Washington, DC: USDOE. November 1991.

US DOE. *RCRA Corrective Action Program Guide (Interim Guidance).* Washington, DC: US DOE. May 1993.

USEPA. *A Compendium of Superfund Field Operations.* Washington, DC: USEPA. 1988.

USEPA. *A Guide to Developing Superfund Proposed Plans (OSWER Directive No. 9335.3-02FS-2).* Washington, DC: USEPA. 1989.

USEPA. *A Guide to Developing Superfund Records of Decision (OSWER Directive No. 9355.3-02FS-1).* Washington, DC: USEPA. 1989.

USEPA. *A Guide to Selecting Superfund Remedial Actions (OSWER Directive No. 9355. O-27FS).* Washington, DC: USEPA. 1989.

USEPA. *CERCLA Compliance with Other Laws Manual, Parts 1 and 2.* Washington, DC: USEPA. 1989.

USEPA. *Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities (Proposed Rule). 55* FR *30798, JULY 27, 1990.*

USEPA. *Corrective Action Management Units and Temporary Units; Corrective Action Provisions (Final Rule). 58* Fr8658, February 16, 1993.

USEPA. *Data Quality Objectives for Remedial Program Activities, Volume 1.* Washington, DC: USEPA. March 1987.

USEPA. *Federal Facilities Hazardous Waste Compliance Manual.* Washington, DC: USEPA. January 1990.

USEPA. *Guide for Conducting Treatability Studies under CERCLA (Interim Final).* Washington, DC: USEPA. 1989.

USEPA. *Guidance for Conducting Remedial Investigation/Feasibility Studies (RI/FS) Under CERCLA (Interim Final).* Washington, DC: USEPA. October 1988.

USEPA. *Guidance for RCRA Corrective Action Decision Documents: The Statement of Basis, Final Decision, and Response to Comments.* Washington, DC: USEPA, February 1991.

USEPA. *Health and Safety Roles and Responsibilities at Remedial Sites.* Washington, D. C.: USEPA. July 1991.

USE PA. *Interim Final Guidance on Preparing Superfund Decision Documents: The Proposed Plan; The Record of Decision; Explanation of Significant Differences; and the Record of Decision Amendment (EPA 540/G-89/007).* Washington, DC: USEPA. June 1987.

USE PA. *Interim Guidelines and Specifications for Developing Quality Assurance Project Plans (OAMS 005/80).* Washington, D. C.: USEPA. 1980.

USEPA. *RCRA Corrective Action Plan (Interim Final).* Washington, DC: USEPA. November 1988.

USEPA. *RCRA Facility Investigation Guidance, Volumes 1-4.* Washington, DC: USEPA. May 1989.

USE PA. *Risk Assessment Guidance for Superfund, Volumes 1 and 2 (Interim Final).* Washington, DC: USEPA. December 1989.

USE PA. *Superfund Remedial Design/Remedial Action (RD/RA) Guidance.* Washington, DC: USEPA. June 1988.

USEPA. *Test Methods for Evaluating Solid Waste, 3rd Edition, Volume 4 (SW-846).* Washington, DC: USEPA. 1988.

**This page intentionally left blank.**